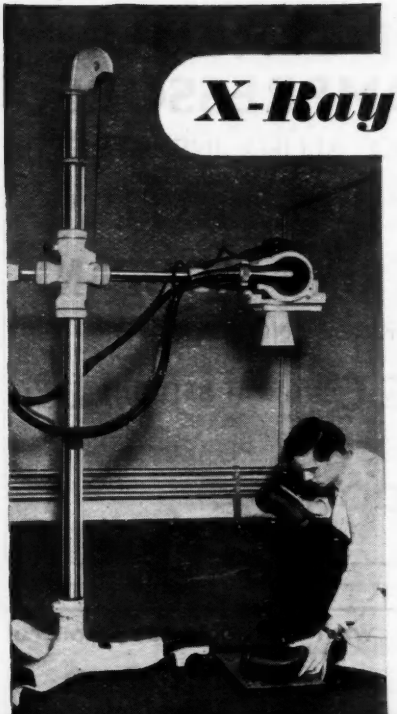
The Chemical Age

VOL LXII 27 MAY 1950 No 1611



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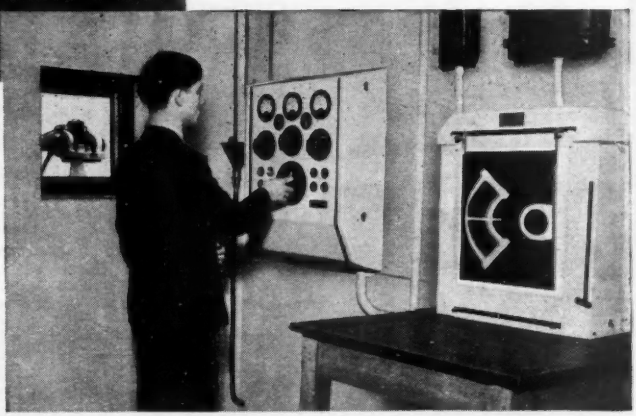

The control panel. The X-Ray tube can be seen through the lead glass window on the extreme left. To the operator's right is an illuminated radiograph of the ebonite tube.

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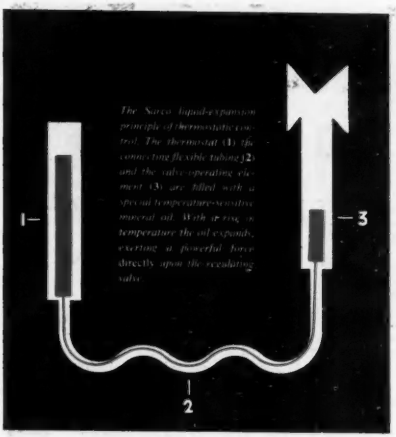

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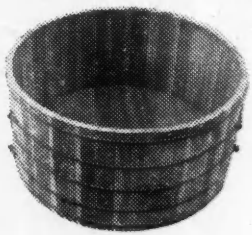

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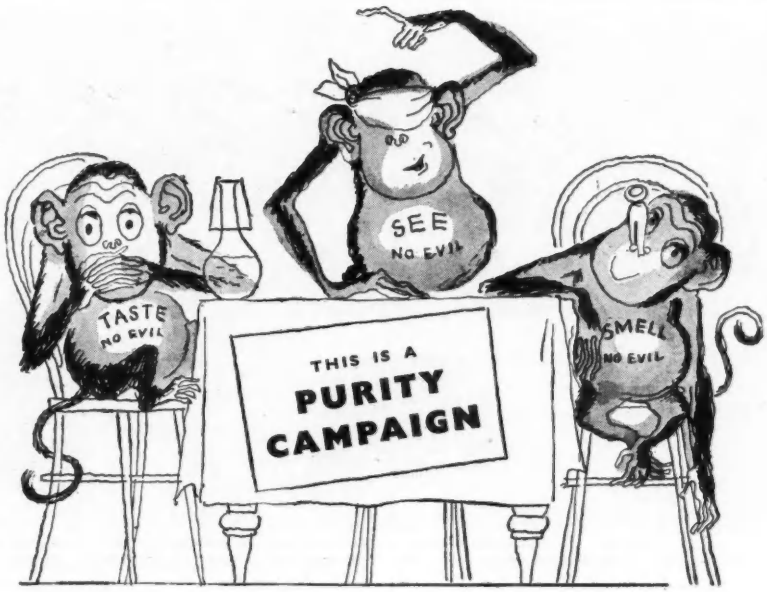

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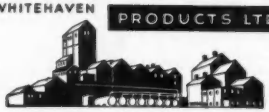

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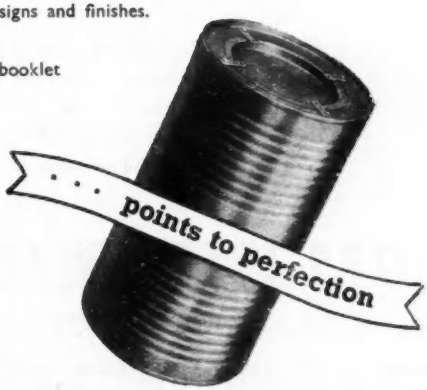

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Co-operation for Safety

THE contribution of some original and stimulating views at the recent national Industrial Safety Conference by one of the prominent personalities of the trade union movement must have recalled to many of the delegates at Scarborough how little practical interest is generally displayed by workers' organisations in this work of—literally—vital importance. At the Royal Society for the Prevention of Accidents conference, Miss Florence Hancock, a former chairman of the TUC, was concerned more to safeguard amenity, especially of women operatives, than with safety alone. The two objectives, however, are well recognised to be closely related, and this trade union contribution encourages hope of collaboration of which there is great need at the moment.

What should be the attitude of a trade union to safety matters? Any association (of dukes or dustmen) exists, or should exist, primarily for the good of its members. It may have quite a few other claims—even perhaps that it works for the common good of man, but those aspirations are not often its prime objective. The fact that the legal department of a trade union has succeeded in winning a Common Law action for negligence, procuring for one of its members £*x* as substantial damages for negligence is often used as a bait to increase membership. That form of protection is no doubt a useful service, but it tends to obscure the fact that compensation is little solace to a man or woman who has been permanently disfigured or whose health has been permanently affected. One can imagine the feelings of a man who has for the rest of his working life to accept as an *ex gratia* payment from employers, who may have been able to prove he was guilty of contributory negligence, the rate of pay for the higher rated job he was doing before his accident, although he can no longer carry out the duties of the bigger job.

There is no doubt that employers generally are coming to have a much livelier appreciation of the risks attending the operations carried out in their factories and are very ready to provide measures to minimise those risks. Where such protection has to take the form of protective goggles and clothing, there is, by contrast, a very marked reluctance on the part of the operatives to wear them, or to wear them in the proper manner. The purpose of a pair of goggles is to protect the eyes, yet it still serves very often as a decoration of the peak of the cap. It seems quite illogical that

On Other Pages

(The annual subscription to THE CHEMICAL AGE is 30s.; single copies, 9d.; post paid, 1s. SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited

a man will cheerfully wear glasses at the behest of the local optician but will cavil at wearing a pair of goggles with plain glass windows to protect him against a very obvious risk. Logic seems unfortunately to have very little weight in such affairs.

How far this "resistance movement" could be due to a form of fatalism is exemplified by the following instance which occurred a good many years ago, but which has its parallels today. A young man, fresh from school, was being shown how to roll leather. The chargeman told him that he would never be able to consider himself a good rollerman until he had had his fingers trapped in a machine. The chargeman was, incidentally, the senior first-aid man of the factory and an operative of a very good type. What is more, every man on those machines had been trapped at some time and they all firmly believed it to be the inescapable lot of all who did that kind of work. Such a belief was installed into each boy at the start. It is to be hoped that there has been some eradication of that philosophy in the passage of years. It was a wicked doctrine, which almost certainly intensified proneness to accidents.

Probably the biggest obstacle to industrial safety is the operative, nearly ready for retirement, who is likely to observe that he "has worked man and boy for 55 years in this factory, never worn any (adjectival) gloves, and never been burnt." It is that sort of idle boast, common and harmless in its intention, which often serves to dissuade younger men from taking advantage of the protection provided.

Trade unions can help in the work by encouraging the use of protective devices and by giving their support to the doctrine that an efficient operative takes every care to safeguard himself. Certain unions insist that their members have undergone some form of training, and it seems only reasonable that any such training should include some practice in the use of protective equipment. In some firms, all new entrants have an interview with a member of the safety and welfare staff before starting work. During this meeting safety procedures are often discussed. Is there any reason why the man's union representative should not be present to support the welfare officer in that work? If ever there was an opportunity for real joint consultation, it is in this field.

Notes and Comments

Steel Performance Vindicated

THE ultimate vindication of the steel industry's capacity to supply what the country needs without Government ownership or even supervision of the distribution of its products was seen this week in the decision, announced almost casually in the House of Commons, that State allocation of nearly all classes of steel is ended. Judging by the number of Parliamentary questions in recent months designed to expedite that decision, steel might well have been removed earlier from the category of rationed commodities, where it has remained since the beginning of the war. The Supply Ministry could not fairly defer the freeing of steel much longer in the face of the repeated evidences of the industry's capacity to produce in almost every period substantially more than even the Government planners could anticipate. With the further increase of over 280,000 tons in four months this year, the prospect that a record total of around 16 million tons of steel will be attained in 1950 seems reasonably assured. One result of the continuous improvement of the supply position has been the cessation of complaints of material shortages by makers of chemical plant. They, however, will benefit less than some other industries because one of the forms of steel—certain pipes and tubes, sheet and tinplate—being retained for the time being under the allocation system, is a type they require. The freeing of these remaining hostages should be the next objective by the campaign for liquidating the beleaguered garrison of controls which have outlived their usefulness.

April's Trade

THE fact that the level of chemical exports last month conspicuously failed to preserve the high level of the March returns seems to have come as a direct confirmation of the forecasts made in the recent report of I.C.I., Ltd., that there would be some substantial difficulties in maintaining the high turnover in foreign markets. No firm trend in either direction, however, can safely be discerned on the evidence of one month's figures alone, and when the April total of £7,128,152 is compared with its predecessor in 1949 (£6.89 million) and with the February total this year of £6.85 million it is clear that the reduction of £1.14 million between March and April was no more than the expected reaction from the abnormal level attained in March. Total imports in the chemical group, representing a value of £2,626,423, cost more than in March or in April last year, but this was not a true indication of the increase in material costs, foreseen by I.C.I., since bulk purchases of chemicals as well as of true raw materials were in many cases larger last month. Representative examples of this expansion of raw material intake were crude petroleum, of which some 205 million gallons were purchased at a cost of £6.2 million, and oils and oilseeds.

Experimental Gasification

THE first attempt in Great Britain to prove the practicability of making use of part of the thermal value of coal without mining it has appeared to some watching the first underground gasification experiment at Newman Spinney near Sheffield this week as a rather belated consummation. Apart from the modern attractiveness of exploiting coal deposits in this way, in view of the economic difficulties of normal coal raising which have lately closed some Scottish pits, the theoretical advantages have been recognised by increasing numbers since Victorian times. The theory, which first results from the Derbyshire experiment may soon substantiate, was later described in some detail by Sir William Ramsay in 1912. The delivered price of coal then was approximately what is now charged for its delivery

alone and the imperative need for cheaper sources of energy had none of its present urgency. That need would appear, however, to have received earlier recognition in Italy, Belgium and the U.S.A., and reputedly in the U.S.S.R., as early as 1938. A feature which appears to have been common to all these experiments, however, has been the paucity of evidence of their development on a substantial industrial scale. Even the Alabama project (THE CHEMICAL AGE, *56*, 344, *60*, 264, etc.) which was seen by some as being ultimately a possible source of "unlimited quantities of liquid fuel" seems signally to have failed to make headline news since then. None of this negative evidence has, of course, much bearing upon what may be the final significance of the first gas recordings at Newman Spinney. The low calorific value of any gas won by these methods has no doubt been the common deterrent. It remains to be seen now if the new versatility claimed for the gas turbine can provide the answer.

Paper Education

THE excellence of some journals issued by business organisations—house organs, as they are rather inadequately called—is a comparatively modern phenomenon of which new examples are increasingly frequent. Their high quality of production and presentation deserves admiration and the editorial contents are often technically important. The arrival last week of a new journal (it is almost a book) which embodies all those attributes was therefore welcome. "The Bowater Papers" states that its pages will not primarily be about the Bowater Paper Corporation but will be concerned with the history, art, science and literature of paper making and paper use. That claim is substantiated by the diversity of the articles contained in the first issue; one describes the laboratory testing of newsprint and of the raw materials with which it is made. One of the functions of the pulp-testing laboratory, the carrying out of the *p*H test on the backwater from the paper machines, is explained. The chemical and dye solutions and the testing of china clay slurries are also undertaken in the laboratory. Photographs show the wide variety of instruments used in the paper-testing laboratory to determine weight, substance, tensile strength and other physical properties. The whole gives a memorable impression of the highly developed laboratory services upon which the first requirement of most of the information services—newsprint—depends.

Rust and the Iron Curtain

JENOLITE, Ltd., calling attention to the fact that its rust removing and metal treating products are now represented by companies or agencies throughout the world, observes that substantially the only exceptions are countries "behind the Iron Curtain." "If that great barrier were not just a figment of fear and fiction, but a tangibile reality," adds Jenolite, "we would no doubt have been called in long ago to treat it and keep the rust off."

Awards to Metallurgists

THE Capper Pass Awards for 1949 have been made by the adjudicating committee on behalf of the councils of the Institution of Mining and Metallurgy and of the Institute of Metals to: Jean Matter and Marcel Lamourdedieu (Société Centrale des Alliages Légers, Issoire (Puy-de-Dôme), France); G. Chad Norris (West African Gold Corporation, Ltd.); Dr. E. Scheuer (International Alloys, Ltd., Aylesbury, Bucks.); H. L. Talbot (Anglo-American Corporation of South Africa, Ltd.) and H. N. Hepker (Central Research Laboratory, N'Kana, Northern Rhodesia). The last two received jointly £50 for a paper of "Investigations on the Production of Electrolytic Cobalt from a Copper-Cobalt Flotation Concentrate."

These awards, which are made annually from a sum of £200 given by Capper Pass & Son, Ltd., Bristol, are £100 per annum for one or more awards to authors of papers on some aspect of non-ferrous extraction metallurgy; £100 per annum for one or more awards to authors of papers relating to some process or plant used in the fabrication of non-ferrous metals, contributed by persons engaged full time in industrial practice.

UNDERGROUND GASIFICATION

Slow Start of the First U.K. Experiment

THE first practical experience in this country of underground gasification of coal, at Newman Spinney, some ten miles from Sheffield, on Monday, has not yielded conclusive evidence that it will be possible to profit by this method from the vast deposits of low-grade or inaccessible coal which is known to exist.

Six thermite bombs and their initial igniter charges of coal were fired electrically shortly after 2 p.m. and substantial emission of smoke and gas started. No measurement was made, however, of the constitution of what was emitted and the one critical recording, of the temperature of the gases, indicated that the heat value was very low. During the two hours that the progress was watched, there was no evidence that a high rate of combustion had been reached and experts were unwilling to affirm definitely that the coal seam itself had ignited. There was reason to believe that the water content was high in the neighbourhood of the seam, which could have delayed combustion and explained the low temperatures. On Tuesday is was concluded the experiment had not succeeded and more incendiaries were inserted. It was found possible to ignite the gas then emitted and samples are now being tested.

Of the much wider implications, such as the suitability of the gases to provide fuels, the present tests do not, of course, provide any evidence.

Full Collaboration

The outstanding characteristic of the work of which this was the culmination, has been the full co-operation that has been secured between industrial groups and Government departments. In collaboration with the Ministry of Fuel and Power as advisers or participants are the NCB, the Gas Research Board, Imperial Chemical Industries, Ltd., the Anglo-Iranian Oil Co., Ltd., Shell Petroleum Co., Ltd., the Fuel Research Station, the Atomic Energy Research Station, British Coal Utilisation Research Association and a number of other Government agencies. Duplicating to some extent the work at Newman Spinney are laboratory tests being carried out at the Fuel Research Station. There large blocks of coal have been drilled to create miniature gasification systems and preliminary results have been obtained. Those tests are proceeding.

The Ministry of Fuel records that serious drilling started at Newman Spinney in December. A series of (fire precaution) barrier holes was drilled about 200 ft. back from the exposed face (High Wall). Location holes were also drilled at 250 ft., 300 ft. and 350 ft. on the estimated line of the horizontal to locate precisely the position of the horizontal before drilling the operational and drainage holes to intersect it.

The total length of the horizontal borehole had to exceed 300 ft. Some 50 ft. at least, towards its far end, was required to be in the coal seam and preferably in the coal itself. Limited experience was available of drilling near the horizontal and virtually none in guiding a drilling bit to remain in a leaf of coal. Even if the bit followed a straight line and if the seam dip were consistent and accurately known, the maximum allowable error was less than 1°.

Controlled Drilling

In early March, after drilling six abortive holes, a seventh "horizontal" was drilled to nearly 400 ft., which showed promise of being useful. The borehole, as finally established, was in a 6-in. coal band from 240 to 247 ft., and in the lower leaf from 260 ft. to 280 ft. It was decided to make intersections by drilling the vertical operational holes at 240 ft. and 290 ft., leaving the whole length of the reaction zone between these points below the main upper leaf.

The next problem was to drill the two operational verticals and the drainage hole so as to intersect the horizontal at the desired points. The precision required is beyond the limits of ordinary survey under the conditions imposed by the site. Two new techniques were developed, which, it is now observed, may have application in other connections (*e.g*, methane drainage).

The Post Office Research Branch produced an electro-magnetic device, the magnet element of which could be inserted along the 4-in. horizontal borehole. A compass element is lowered down an adjacent vertical and, by impulse repeated to the surface instruments, the relative distance and direction of the two elements can be determined. For greater accuracy a repeater compass was made available by the Admiralty, but this required a 7½-in.

(*continued at foot of next page*)

Chemical Traders Deplore Controls

The Need for Freedom in Commerce

AN appeal for greater freedom from controls in order that the old spirit of adventure might once again serve commerce and industry, was the keynote of the speeches at the annual luncheon of the British Chemical and Dyestuffs Traders' Association, in London last week.

A gracious message from the King, in response to the association's greetings, was announced by the chairman, Brigadier C. Norton Stafford, C.B.E., T.D.

Proposing the toast of the association, Sir Herbert Williams, M.P., in an amusing speech recalled the old jibe that "manufacturers make goods, but merchants make money." He emphasised that British trade had, in fact, been built up through the initiatve and enterprise of the merchants.

Asking Permission

The trader to-day was overwhelmed by restrictions and controls. Why should anyone have to ask for permission before he could buy or sell anything?

The trader was the buffer between the producer and consumer. It was his duty to the whole productive industry to tell the producer if there was anything wrong with his products.

They, as a trading association, he said, were too modest about their achievements. People did not know of their activities—they should be told more.

The president, Mr. G. S. Bache, replying, referred to his difficult task in following Mr. Victor Blagden, who for some 25 years had done so much good work for the association.

It would not be long, he hoped, before there would be a clean sweep of the numerous Orders in Council by which they were inundated, and a chance for the association to use its own initiative to expand the great potential volume of export trade.

He referred briefly to the protest sent by the association to the President of the Board of Trade in connection with the report on the chemical industry for which he had called.

"The Guests" was proposed by Brigadier C. Norton Stafford, the chairman, who read a message of regret for his absence from Mr. Victor Blagden, at present on a visit to the U.S.A.

In response, Sir Frank Nixon, K.C.M.G., C.B., president of the London Chamber of Commerce, said that the chamber was happy to range itself among the battalions fighting for freedom from Government control.

The merchant adventurers of 150 years ago, who laid the foundations of British trade, had never heard of a "sterling gap." It was no good their saying "we'll sell you this but we want paying in convertible currency." They had to use their initiative to buy also, and so make London into a great centre of trade. America must learn that she must buy as well as sell.

Bulk Buying

All the efforts of the OEEC for liberalisation of trade in Europe would remain unavailing so long as bulk buying and controls remained in this country. Free markets and free currency went together.

Among those present were: Mr. C. W. Lovegrove (vice-president); Sir Harry Jephcott (ABCM); Dr. G. W. Bennett (Government chemist); Mr. G. H. Ward (Canadian Chamber of Commerce); Mr. C. E. Kihlstedt (Swedish Chamber of Commerce); Mr. J. A. Devine (Board of Trade); Mr. E. Mackenzie Hay (president, British Federation of Commodity Associations); Mr. C. Lord (president, Association of Tar Distillers) and Major T. Knowles (director, Association of Tar Distillers).

UNDERGROUND GASIFICATION

(continued from previous page)

diameter vertical hole, whereas the P.O. compass can be used in one of 4-in. diameter.

The Anglo-Iranian Oil Company (engineering research branch) developed radioactive means for location. For maximum range, some cobalt isotope of maximum safe intensity was produced by Harwell. This was inserted along the horizontal and a Sonde lowered down the verticals, giving surface readings for calculation of the distance and direction of the isotope.

Both systems worked satisfactorily and provided locations to within a few inches with close agreement. It is too early to give a final assessment of merit of the two techniques.

LEATHER CHEMISTRY

Increased Scope of the New Laboratories

THE theme that Britain's great activity and success in scientific research must in future be matched by an equal readiness to apply the results to industries, was stressed by Sir Ben Lockspeiser, secretary of the Department of Scientific and Industrial Research, in an address at the official opening—performed by H.R.H. the Duchess of Kent—on May 22, of the new laboratories of the British Leather Manufacturers' Research Association, at Milton Park, Egham, Surrey.

It was not sufficient in any trade to have only craftsmanship. We must do as some other nations were learning to do—supplement craftsmanship with science. It was easy to apply science in an industry born in the laboratory, like rayon manufacture, but in craft industries, such as textiles and leather, it was very different; the materials were not uniform and the chemistry extremely complex. Experience had shown, however, that sooner or later the scientific approach would supersede empiricism.

As regards leather chemistry, they now had sufficient knowledge to justify the belief that big advances might soon be expected in the manufacturing processes.

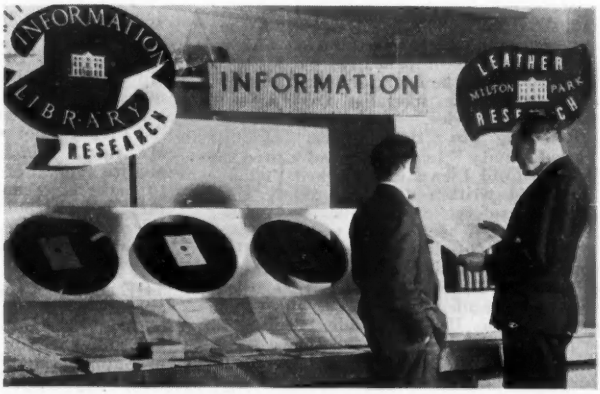
A Press tour of inspection of the new laboratories, on Monday, revealed that these occupied some 15,000 sq. ft., comprising 50 rooms, and that the very much increased space, as compared with the old Nelson Square, London, S.E.1, premises, would give the association greater facilities generally, but would be used particularly for the development of the chemical engineering side of the industry. Problems in the engineering sphere which the association had been called upon to resolve had previously had to be put out to firms in the trade and engineering establishments having the special facilities.

Current Work

Open days were held at the laboratories on May 23, 24 and 25, when exhibits staged for visitors included a number of items connected with the biochemistry of hides and skins. In this section of the laboratories was shown, for example, apparatus for the determination of the total nitrogen of the collagen and elastin fabrics of hides and skins, the amino nitrogen and amide nitrogen, also apparatus for desalting protein hydrolysates. Beckman and other electrodes for the determination of alkaline *p*H values were shown.

Illustrating the chemistry of leather manufacture were numerous samples showing the effects on the raw material of the tannage process at all stages. In the sphere of organic chemistry were shown specimens of the laboratory work in progress associated with such subjects as the study of the constituents of vegetable tannins, their isolation and the determination of the constitution. Both the condensed and hydrolysable tannins are under investigation.

Corrosion problems in tanneries, and steps to solve them, were illustrated by samples of treated and untreated metals.



Mr. Seaton E. Fox (right) in the information department, of which he is in charge, of the new laboratories at Milton Park, Egham, Surrey, of the British Leather Manufacturers' Research Association. This department is concerned, among other things, with the publication of the association's "Laboratory Reports", "Monthly Digest" and "Members' Journal."

Promoting Safety in Industry

Joint Action Still Awaits Government Support

A PROPOSAL to the Government by the Royal Society for the Prevention of Accidents, to set up a co-ordinating committee to review the whole problem of industrial safety has—for the present—been turned down.

That decision by the Minister of Labour was revealed by Lord Llewellin, president of the RSPA, at the National Industrial Safety Conference, held at Scarborough, this month. The society, he added, would not abandon its proposals, but would put them forward when the time was suitable.

Training in Schools and Works

The president said that those responsible for the society's industrial policy had no intention of waiting on events, but were going ahead with various projects. For example, plans were being made to introduce safety training into technical schools. As a first step, a small committee had been formed, which included industrial safety experts and educationalists, to consider what action could be taken.

It was gratifying, said Lord Llewellin, that the Minister of Education should have sent two inspectors to one of the society's training courses for safety officers.

The proper place to learn industrial safety is inside the works and when an employer takes a worker into his factory it is his duty to see that the new entrant is trained in safe methods of working and not allowed to encounter danger through ignorance, the president maintained.

It was suggested that there should be co-operation between the RSPA and the joint industrial councils. The society's long experience of safety organisation and its knowledge of basic principles would be at the disposal of the councils which, in turn, could contribute specialist knowledge of different industries.

Referring to the reports of the "productivity" teams that had visited the U.S.A., Lord Llewellin remarked that one team had written of works safety committees, safety propaganda and other measures as if such things were unknown in Britain. One is forced to the unwilling conclusion, he said, that the representatives of certain industries know very little about organised accident prevention and, when visiting the U.S.A., made their first acquaintance with safety methods which they could have seen practised by industries in their own country.

Sir Wilfrid Garrett, formerly H.M. Chief Inspector of Factories, who spoke on "Some Newer Ideas of Accident Prevention," said that if the knowledge, now scattered in various Government departments, firms and trades unions and in the minds of safety officers, could be collected and made available in simple form accidents could be so materially reduced as to pay, even in hard cash, for all the trouble involved.

He further suggested that within 25 years it would be found an advantage to concentrate all the inspecting branches dealing with the protection of the worker into one Ministry.

Miss Florence Hancock, the trades unionist, expressed the view that if a job is bad for women it is also bad for men. It should not be a question of preventing women from doing certain jobs, but rather of ensuring that the conditions for men and women alike, in any occupation, are such that the work will not endanger health and safety.

Parliamentary Topics

TO Dr. Stross, who asked if the Minister was aware that the River Thames was so polluted at Teddington that sisal rope was rotten if immersed for one month, and that steel shafting corroded within six months; and whether he would state the chemical nature of this pollution and its source, Mr. Bevan said: I am not aware of any pollution in the River Thames at Teddington at present which would cause abnormal damage of this nature.

* * *

IN answer to Dr. Stross, who asked the Minister of Health if he would promote an investigation to establish whether iodised salt may cause any reaction in persons sensitive to potassium or sodium iodide, Mr. Bevan said he was advised that the minute amount of iodine involved appeared to make any such investigation unnecessary, but the point would be further considered in connection with other representations on these proposals.

* * *

THE ending of the steel allocation scheme, except in respect of sheet steel and tin plate and certain types of tubes and pipes, was announced in a reply by the Minister of Supply (Mr. G. R. Strauss). (*Comment, page* 773).

CHEMICAL EXPORTS IN APRIL

Over £1m. Decrease Since March

EXPORTS of chemicals, drugs, dyes and colours in April, at £7,128,752, were £1,145,638 less in value than the March total. Among countries to which smaller exports of chemicals have been made, compared with last month, are: British West Africa £189,347 (£270,952), British East Africa £122,100 (£132,327), Sweden £218,391 (£299,775), Norway £115,375 (£151,059), Netherlands £207,522 (£248,589), Italy £147,262 (£272,207), Egypt £180,229 (£274,930), U.S.A. £185,800 (£298,215), Brazil £393,563 (£509,599).

Notable decreases, in total exports (March figure in parentheses) were: Nickel salts £22,581 (£37,520), potassium compounds £37,934 (£48,119), sodium carbonate £110,476 (£180,133), caustic soda £260,711 (£309,256), sodium silicate £14,352 (£21,653), tar oil, creosote oil, anthracene oil, etc., £91,762 (£213,818), zinc oxide £63,180 (£100,826).

EXPORTS

	April, 1950	April, 1949
	Gal.	Gal.
Cresylic acid	228,121	73,168
	Lb.	Lb.
Salicylic acid and salicylates ...	196,279	131,031
Value of all other sorts of acid ...	£121,602	£112,365
	Tons	Tons
Sulphate of alumina	1,555	2,700
All other sorts of aluminium compounds	1,434	396
Ammonium sulphate	12,849	5,316
Ammonium nitrate	5,012	6,763
All other sorts of ammonium compounds	1,394	1,737
	Cwt.	Cwt.
Bleaching powder	12,580	40,880
All other bleaching materials ...	11,239	7,848
Collodion cotton	1,301	1,709
	Tons	Tons
Copper sulphate	7,046	9,216
	Cwt.	Cwt.
Disinfectants, insecticides, etc. ...	36,565	51,336
	Tons	Tons
Fertilisers	1,318	604
Value of gases (compressed, liquefied or solidified)	£24,115	£21,675
	Cwt.	Cwt.
Lead acetate, litharge, red lead, etc.	7,093	3,432
	Gal.	Gal.
Tetra-ethyl lead	102,872	152,217
	Tons	Tons
Magnesium compounds	532	905
	Cwt.	Cwt.
Nickel salts	3,529	4,078
Potassium compounds	4,397	6,435
	Tons	Tons
Salt	18,901	14,474
	Cwt.	Cwt.
Sodium carbonate	208,769	300,275
Caustic soda	193,251	103,148
Sodium silicate	16,012	24,080
Sodium sulphate	2,014	82,342
All other sodium compounds ...	80,555	69,554
	Gal.	Gal.
Tar oil, creosote, oil, anthracene oil, etc.	1,636,422	2,299,784
	Tons	Tons
Zinc oxide	989	727
Total value of chemical manufactures (excluding drugs and dyestuffs)	£3,854,667	£3,614,873
Value of quinine and quinine salts	£11,221	£29,248
	Lb.	Lb.
Acetyl-salicylic acid	182,993	131,625
	100 International Units	100 International Units
Insulin	580,064	680,732
	Mega Units	Mega Units
Penicillin	658,222	586,729
Total value of drugs, medicines and preparations	£1,371,756	£1,583,847
Total value of dyes and dyestuffs ...	£945,285	£817,017
Total value of paints, pigments, colours, etc.	£957,044	£875,702
	Cwt.	Cwt.
Plastic materials	42,740	28,913
Value	£566,030	£362,867
	Cwt.	Cwt.
Chemical glassware	960	1,078
Value	£39,788	£38,142
	Cwt.	Cwt.
Fans	3,882	4,149
Value	£107,124	£120,013
	Cwt.	Cwt.
Furnace plant	12,790	8,730
Value	£185,142	£125,291
	Cwt.	Cwt.
Gas and chemical machinery ...	13,069	37,022
Value	£167,629	£394,183

IMPORTS

	April, 1950	April, 1949
	Cwt.	Cwt.
Acetic anhydride	2,768	9,287
Acetic acid	—	—
Boric acid	900	3,620
Carbolic acid	2,197	—
Value of all other sorts of acid ...	£67,043	£19,942
	Cwt.	Cwt.
Borax	9,480	7,200
Calcium carbide	—	—
Cobalt oxides	268	448
	Tons	Tons
Fertilisers	26,438	19,415
	Lb.	Lb.
Glycol ethers and glycol ether esters	271,372	678,285
Iodine	—	66,050
	Cwt.	Cwt.
Potassium chloride	525,147	467,259
Potassium sulphate	26,300	18,500
All other potassium compounds ...	9,327	2,171
Sodium nitrate	—	80,645
All other sodium compounds ...	7,308	1,271
Carbon blacks (from natural gas)	72,999	32,591
Value of carbon blacks	£296,729	£105,925
Total value of chemicals, drugs, dyes and colours	£2,626,423	£2,044,019
	Tons	Tons
Sulphur	43,247	34,442
Value	£432,503	£286,035
	Cwt.	Cwt.
Gas and chemical machinery ...	3,313	5,309
Value	£16,450	£49,265

ELECTRONIC POLAROMETER
Improved Accuracy and Speed

AN electronic polarometer designed with the object of getting greater accuracy and higher speed of operation than was obtainable with existing commercial polarographs, was described by C. H. R. Gentry in a paper delivered to the Physical Methods Group of the Society of Public Analysts, recently.

In principle, the instrument differed from existing polarometers in that the maximum polarographic current was measured, rather than the usual "average" current.

This measurement was made by adjusting a potentiometer until an electronic null point indicator was balanced; the current was then read off from the potentiometer to an accuracy of 1 in 1000. By a suitable choice of circuit values, the current was measured in this manner without affecting the emf. applied to the polarographic cell.

For rapid operation, the principle of tangent slope compensation was used, which enabled diffusion currents to be obtained directly without the need for the complete plotting of the polarographic wave or for graphical construction.

This tangent slope compensation was in effect to be considered as an electrical method of graphical construction.

The basic circuits of the instrument have been incorporated in a laboratory model which has been successfully used for several years. The greater accuracy extended the range of polarographic analysis to determinations previously made by volumetric or gravimetric methods.

A commercial model of the instrument has been built by the Mullard Electronic Research Laboratories. This was basically the same as the laboratory instrument but incorporated several improvements. Of particular note were a very stable electronic battery circuit and a method of current measurement which was advantageous for measuring a small polarograph wave preceded by a large one.

For use in conjunction with the polarometer, a dropping mercury electrode had been designed which incorporated a thermostat, capable of taking ten cells at a time, and controlled to within $\pm$ 0.05°C.

Photoelectric Spectrometry Group

The Summer School of the Photoelectric Spectrometry Group will be held at University College, Southampton. The course will be from July 8-15, and members will be accommodated in the Connaught Hall.

IMPROVED FREEZE DRYING
U.S.A. Uses Infra-Red Heat Source

A NEW type of freeze-drying apparatus which uses infra-red rays as a heat source is responsible in the U.S.A. for increased production and a 50 per cent cut in the price of ACTH, the pituitary hormone newly employed against diseases such as arthritis and rheumatic fever. The Armour Laboratories, Chicago, reports that the principle speeds up the drying process as much as ten times, and gives a greater yield of the hormone by reducing the loss of potency previously experienced in the drying process. The price of ACTH-Armour Laboratories, Chicago, reports that a gram to $100.

In the ordinary freeze-drying method, the heat was applied by means of a liquid, ethylene glycol, for example, at about 40° above zero. The temperature difference and the effect of the vacuum dried the material in a matter of hours.

The new method substitutes infra-red rays for the liquid as a heat source. The infra-red wave band absorbed by water lies mainly between two and eight microns or 20,000 to 80,000 Angstrom units. This energy, when absorbed directly by the water, heats it to the point where it is evaporated out of the mixture, leaving behind the dry ACTH. The infra-red rays are emitted by a series of fine wires, electrically charged, a few inches below ACTH vials.

The process is said to need only a tenth of the time of the old; it is not necessary to keep the material so cold and a much lower vacuum is used. Wide-mouthed bottles were necessary in the old method to permit free escape of water vapour. It is possible now to cap the bottles loosely and still get efficient drying. This prevents occasional contamination.

Paint Companies Merge

AN important development in the Scottish paint industry is the formation of Federated Paints, Ltd., Glasgow, which has initially a capital of £200,000, and is to acquire at least 90 per cent of the shares of Boyd Stewart & Co., Ltd., Strathclyde Paint Co., Ltd., and Williamson Morton & Co., Ltd., all long established Glasgow firms. The firms will continue to trade under their former names and retain their proprietary brands. Advantage should be gained by the combination of research and administrative activities. The directors of the new group are Messrs. John D. W. Davidson, Gavin Boyd, Charles E. Stewart, James Clarkson, Robert G. Clarkson and W. A. Mackinlay.

I.C.I. RESEARCH ACTIVITIES

Contributions to Fundamental and Practical Advancement

FOR many years Imperial Chemical Industries, Ltd., has made a practice of assisting educational establishments with financial grants, in the belief that it is in its interests to give help, wherever possible, to the bodies which are responsible for the training of scientists and are engaged in the acquirement of new basic knowledge.

In this way a total of about £112,000 is spent annually by the company in the establishment of post-graduate research fellowships in chemistry and allied sciences at various universities and hospitals, special donations, grants for apparatus and chemicals, and the support of special researches of a fundamental character on subjects of direct interest to I.C.I. The company's practice of making these grants without attaching any conditions is regarded by the university and other authorities as being one of their valuable features.

A comprehensive review of these factors and of practical results of the group's own research forms an interesting section of the 23rd annual report of I.C.I., Ltd.

In addition to these grants, the company, it is noted, has contributed to fundamental research and general scientific knowledge by means of work in its own laboratories. Although by far the greater part of this work consists of studies in applied research directed towards the improvement of existing products and processes and the devising of new ones, a considerable amount of more fundamental research is undertaken. This is not only deemed to be valuable in applied research, but to form a serious contribution to the advance of scientific knowledge in general.

Toxic Chemicals

Investigations into the relationships between the chemical constitution of toxic substances and the intensity of their action have yielded much valuable background knowledge which it is hoped will assist in the search for new and effective drugs, insecticides and fungicides. Considerable attention has been given to the factors affecting the growth of crystals, as this has a direct bearing on the handling properties of many of the company's products and in particular on the problem of preventing powders from caking on storage. For example, the discovery that the tendency of ammonium nitrate to cake during storage can be overcome by the addition of a small proportion of a dyestuff called acid magenta has facilitated its handling and has enabled explosives to be made less liable to become hard and insensitive during storage.

A discovery, which is of importance to chemical engineers, was published in 1949 and concerns the explosive limits of gaseous mixtures. It has been shown in theory, and confirmed in practice, that the range of compositions within which a mixture of an inflammable gas and oxygen can be made to explode can be restricted by the addition of another inflammable gas of given characteristics. By this means reactions, which would otherwise be liable to lead to explosions, can be carried out safely.

Lime

Although lime is one of the most important of industrial chemicals, in the past comparatively little fundamental work was done on its reactivity. By the use of modern research tools, such as the electron microscope, some interesting results have already been obtained, some of which contradict old-established ideas regarding the behaviour of lime, and, if properly applied, should increase the efficiency of the many processes in which lime plays an important part.

The company has continued to undertake extensive background research into the chemical and physical structure of polymers, in the hope that this will lead to new and improved plastics. The usefulness of many plastics and other organic materials is still much restricted by their limited resistance to strong sunlight and weather conditions. The company is studying the chemical mechanism of such effects and the possibility of extending the range of usefulness of the polymers by the employment of stabilisers to prevent degeneration in unfavourable conditions.

Many processes used by I.C.I. will work only in the presence of a catalyst. In the past the discovery of a suitable catalyst for any given process was largely a matter of trial and error, but the company is now trying to find a firmer scientific basis for the choice of catalysts. In doing so, very close and friendly relations are maintained with those university research workers who have similar work in hand.

An important group of researches has for its object the widening of the com-

pany's business in inorganic chemical raw materials and intermediate products required in rapidly increasing quantities for the production of solvents, plastics, plasticisers, paints and detergents. Many of the heavy organic chemicals have hitherto been obtained from hard currency areas. It is the company's aim to make these materials from coal or its derivatives, or from oil obtainable from sterling sources, and to do so by new and improved processes employing high pressure and other modern techniques.

Cheaper Water-Gas

Important established products of the company, such as ammonia and its derivatives, methanol and petrol, require for their manufacture large quantities of water-gas or of hydrogen made from water-gas, and these raw materials are also required in increasing quantities for new products now being developed. Because of the high cost of the good quality coke from which water-gas is now made the development of cheaper water-gas processes is one of the company's major research objectives. Work on an entirely novel process has already gone beyond the laboratory stage and a large semi-works-scale plant has been erected. There are still several detailed practical difficulties to be overcome, but, if successful, the new process will not only be more efficient than the old conventional method but it will make possible the use as raw material of non-coking coals or cheap coke breeze, thereby helping to conserve the country's high quality coke for essential metallurgical uses.

During the year a new type of blasting explosive was brought to the stage of full-scale production. This type of explosive, of which Unibel is an example, is the outcome of continuous research to improve the safety of coal mining explosives and it has been officially recognised to be as safe as sheathed explosives.

Continued research on the Cellofas range of cellulose derivatives has led to improvements in the method of manufacture and a widening of the range of applications.

New short-delay detonators have been widely tested during the past twelve months and it has been conclusively shown that by their use the ground vibration from a given weight of explosive can be much reduced. This is an advantage when blasting has to be carried on in inhabited districts, as happens in certain open-cast coal sites.

Until recent years, the industrial chemistry of fluorine was comparatively little studied, and the properties and potentialities of fluorine were largely unknown. The company has done much exploratory work in this field and already certain fluorine compounds seem likely to become of industrial importance. Anhydrous hydrogen fluoride is one of the compounds which the company is now producing on a works-scale, and another fluorine product which is growing in importance is Fluon, a plastic with remarkable heat and chemical resistant properties.

New and useful additions have been made to the company's range of dyestuffs and textile auxiliary products, an interesting example being Carbolan Salt A, which facilitates the level dyeing of wool with many difficult but otherwise attractive wool dyestuffs. A new range of pigments for colouring viscose in the mass, before spinning, has been developed and is being favourably received.

A special department of the Plastics Division is responsible for research and development work on new synthetic textile fibres. Considerable technical advance has been made in the spinning of Terylene polyester yarn in the continuous filament and staple forms and the pioneer plant is being substantially extended in order to facilitate and widen experimental work with this new fibre in textile industry.

Progress has been made in developing new seed dressings, particularly combined dressings capable of protecting cereals and sugar beet from seed-borne and soil-borne diseases as well as from attack by wireworm at the seedling stage. Developments have also been made in the production and use of smoke generators containing insecticides, for use in the glasshouse against harmful insects.

New Use for Gammexane

Uses for the insecticide Gammexane continued to increase, and an interesting new development was the clearing of triatomid bugs from living quarters in South America. Huts treated once with Gammexane have remained completely free from infestation by these bugs for over a year, and it is hoped that the use of Gammexane in this way will help to reduce the incidence of Chagas disease, which causes great suffering and mortality in South America.

At home, an increased use of fertilisers is probably the most important single means of achieving a larger production of food, and the company is increasing its productive capacity for nitrogenous fertilisers in order to meet the expected growth in demand.

The company has been devoting much effort to solving some of the most difficult problems in the realm of medicine. One

(*continued on page* 785)

SHRINK-PROOFING OF WOOLLEN FABRICS

Work of the Wool Industries' Research Association

WOOL fibres and fabrics are subject to two main types of shrinkage, resulting from causes which are largely distinct and unrelated. The term "relaxation shrinkage" is self-explanatory. Woollen goods stretched while damp during manufacture, and dried in a stretched condition, will relax and revert to their original length when suitable conditions of moisture and warmth occur. The manufacturer can overcome this either by finishing the fabric without stretch or by relaxing an over-stretched fabric before it is marketed.

Relaxation shrinkage is not peculiar to wool; it is also experienced with cotton, rayon and other textile fabrics. Woollen fabrics, however, can also shrink by an entirely different mechanism known as "felting," the occurrence of which is accompanied by a thickening and hardening of the texture and a decrease in air permeability.

Wool fibres have a slightly rough surface and are rougher in one direction than the other, particularly when wet. When a mass of fibres is wetted and moved about or squeezed, there is, of course, a tendency for the fibres to become matted. This felting or compacting together of the fibres naturally leads to a reduction in the size of the fabric.

Felting does not occur to any serious extent unless the wool is damp or wet, and it is essentially the result of mechanical movement. Unlike relaxation shrinkage, it cannot be reversed by simple stretching, since the original dimensions can only be restored by actually breaking the fibres, which during felting become irreversibly interlooped.

Mechanism of Felting

Felting shrinkage is experienced only in the presence of mechanical agitation and compression, and not during simple soaking or steaming. While some difference of opinion exists as to the exact mechanism by which felting of wool takes place, it is generally agreed that an essential part is played by the ability of the wool fibres to travel root end first when rubbed, a property which arises from the greater roughness of the wool fibres when rubbed from tip to root than when rubbed root to tip.

Practically all processes to prevent wool felting act by changing or removing the surface of the wool fibre which is responsible for this remarkable property. Though usually referred to as "unshrinkable" treatments, they are actually "non-felting" processes and usually do nothing to overcome relaxation shrinkage.

Many promising ideas for the prevention of felting have been suggested by the laboratories. The translation from test-tube to production, however, is liable to be particularly costly and difficult where textile processes are concerned, and the number of processes which have achieved some degree of commercial development still remains relatively small.

Wet Chlorination

It is noteworthy that wet chlorination—the original process introduced some 50 years ago—is still the most widely used shrinkage resistant treatment for wool. It consists in the application of solutions of hypochlorites (originally calcium but now usually sodium) to which varying quantities of acid are added. When the absorption is completed, the wool is rinsed in a clearing bath containing sodium sulphite or bisulphite. Originally, strongly acid solutions of hypochlorite (*p*H 2) were almost always used.

These acid solutions suffer from the disadvantage that the chlorine is present in a free state and, being only slightly soluble in water, readily escapes from the solution, with the result that unpleasant working conditions are created. A further objection is that such solutions react with wool at so high a speed that it is difficult to ensure level treatment of all the fibres in the fabric.

Treatment tends to be confined to the surface, with the result that the outer fibres are liable to be overtreated and damaged, while many of the inside fibres remain entirely untreated. This results in the production of fabrics with an initial resistance to felting, which, however, tends to break down on long continued washing.

Many attempts have been made in recent years to achieve better control of the wet chlorination processes. Under less acid conditions (*p*H 2-4) the reaction is a little slower and the tendency of chlorine to be lost to the atmosphere is also reduced. This is even more marked at higher *p*H (4-8), but, unfortunately, in these more alkaline chlorinations a yellowing of the wool also becomes apparent. Nevertheless,

improvement has been achieved by the gradual addition of the chlorine liquor over a period of perhaps 30-40 min., instead of introducing it all initially.

One wet chlorination variant involves soaking the goods first in an acid bath, squeezing them, and transferring them to a second bath containing the hypochlorite. In practice this procedure works well when small batches are handled, but it is difficult to control exactly the carry-over of acid.

An old German process used chloramine T (under the name of Aktivin) for the chlorination of wool, and attempts have been made to improve the wet chlorination process by adding substances like *p*-toluene sulphonamide, which should react with the free chlorine to form chloramine T and then perhaps give up the chlorine slowly again to the wool.

Costly Inhibitors

Such inhibitors are rather costly, and quite often were added in inadequate amounts to absorb all the chlorine. They were used in the U.S.A. during the war, but it is not considered probable that the additional expense would be justified by such advantages as are shown.

A recent development consists in the combination of chlorination, under alkaline conditions, with a treatment by dilute potassium permanganate solution. The two reagents were originally applied in successive baths but are now, as a rule, in the same bath. Uniform treatment is obtained because of the slow liberation of chlorine at high *p*H, the permanganate acting as a bleaching agent to eliminate yellowing of the wool. No special plant is required other than ordinary stainless steel dyeing apparatus.

One of the objections to wet chlorination treatments is the considerable loss of wool substance which occurs. This may be as much as 8 per cent, but in the British finishing trade is usually about 4 per cent. But for this loss of material, the process would be relatively cheap.

Dry gaseous chlorination was introduced by the Wool Industries' Research Association in 1934 to overcome some of the disadvantages of the wet process. In this method the wool is first dried to about 7 per cent " regain " and placed in an apparatus from which substantially all the air is then evacuated. Chlorine gas is admitted and re-circulated for about 40 min. Finally the excess is blown off, the the cycle of operations being completed in about 60 min.

More than 30 million lb. of wool have been treated by this method, which gives a very consistent and reliable product of high shrinkage resistance. Only a negligible weight of wool substance is lost, the cost of the process being between 3d. and 6d. per lb., depending on conditions. The cost of a plant capable of treating 300-400 lb. weight per batch is approximately £1000. One advantage of this process is that the reacting chlorine remains in the wool and can be easily estimated as a means of controlling the degree of treatment.

Of much more recent development is a process using sodium or potassium hydroxide dissolved in 95 per cent ethyl alcohol. The wool must first be dried below 8 per cent regain, and thermostatic control is advisable. A continuous process for tops was evolved but does not seem to have reached commercial development. Some 60 tons of socks were treated up to 1943, after which the process was apparently abandoned.

Advantages claimed for this process were: little change of colour and no damage to the cellulosic fibres also present. Disadvantages are: the fire hazard, possible Excise difficulties with the alcohol, and a slight harshening of " handle."

A similar process developed by Hall and Marsh of Tootal, Broadhurst, Lee, Ltd., uses alkalis dissolved in binary and ternary mixtures of alcohols, e.g., butyl alcohol and white spirit. This process has been used on a small industrial scale.

Sulphur-Chloride Treatment

A process involving treatments with sulphuryl chloride dissolved in white spirit was introduced in 1935. After being tried in several British mills its use was abandoned, but it is understood to have been used in Australia in 1946. The chief difficulties in its practical applications are that the solutions are highly corrosive, noxious and difficult to handle, and also that an unexpectedly careful control of moisture content in the wool and careful cooling of the baths are essential.

The Perzyme treatment is another process evolved by the Wool Industries' Research Association. As now practised, wool is first given a special hydrogen peroxide treatment and then transferred to a second bath containing papain and sodium bisulphite. Papain, the dried juice of the paw-paw fruit, is an enzyme capable of dissolving proteins and, when activated with bisulphide, can be used to give a controlled attack on the surface of wool fibres. Advantages claimed for this process are a simultaneous bleaching and a soft handle in the product. The disadvantages are that the action is interfered with by

copper-containing metals or by chrome applied in dyeing.

Chlorzyme is the name given to a composite treatment in which wool is first dry-gaseous chlorinated and then given a special reduced papain treatment which further modifies the chlorinated fibre surface, leaving the unchanged wool unattacked. The usual rough, scaly surface of the wool fibre can then be removed to leave a smooth, soft, lustrous surface without damaging or weakening the interior of the fibre. In addition to being completely unshrinkable, it is claimed that the product loses any tendency to irritate sensitive skins. Wool treated in this way has been sucessfully used as a filling for quilts which require to be washed.

Resins

Resin treatments represent an entirely different approach to the problem and involve the deposition of synthetic resins in or on the wool. The most highly developed processes use alkyl melamino resins with formaldehyde, an acid-releasing catalyst, as ammonium phosphate, and perhaps a wetting agent.

After applying this mixture in a two- or three-bowl pad-mangle to give a 60 to 80 per cent absorption, the goods are dried at 200-230° C. for about 40 min. They are then "cured" by polymerising the resin at 140-204° C. for times ranging from 11 min. to 20 sec., according to temperature. Finally, the uncured resin is removed by washing.

Reduced Shrinkage

While the treatment is intended primarily to reduce felting, it is also claimed to reduce the relaxation shrinkage to about half the original value. Further advantages claimed are that the weight of the fabric is increased by 5 to 10 per cent, enhanced resistance to rubbing-up of fibres on the surface is conferred, and the washing fastness of some colours is increased. A disadvantage is the danger to the wool of the very high temperature curing treatment, which, unless properly controlled, appears to cause yellowing in colour, possible harshening of handle and loss of strength. So far, successful application seems to have been confined to piece goods, and the process has not yet been fully developed for garments or knitting yarns.

I.C.I. RESEARCH ACTIVITIES

(*continued from page 782*)

of these is tuberculosis and, although its cause, the tubercle bacillus, is well-known, the eradication of that organism from the human body presents peculiar difficulties, which can be overcome only by much patient biological and chemical investigation.

Diseases due to viruses form another group which is, in general, unresponsive to drug treatment; in fact this group is in much the same position as were the bacterial diseases before the discovery of the sulphonamides.

Disorders of the brain and the malignant diseases present even more difficult problems, for the root causes of the latter remain unknown, and a far more complete understanding of the mechanism of the brain and its response to drugs is needed before a remedy for diseases such as epilepsy can be discovered.

The company has continued to devote much work to the discovery and development of new uses for its products and to the consolidation and extension of existing markets by appropriate technical service investigations.

A striking example of a new use of a chemical product is afforded by Cellofas B, a cellulose ether product made by the Nobel Division. This substance has been found to possess the property of preventing the "after-greying" which normally accompanies repeated laundering of cotton fabrics, as a result of the redeposition of dirt removed from the fabric during washing with soap or synthetic detergents. The "after-greying" of cotton fabrics by washing, familiar to the housewife in the gradual loss of whiteness of sheets and towels, is a defect which hitherto has restricted the application of synthetic detergents in the laundering of cotton goods, but which is largely overcome by the addition of Cellofas to the laundry bath.

In an entirely different field the company is playing a leading part in extending the use of aluminium alloys to road and rail transport vehicles, and the Metals Division Experimental Building Station is providing information on new uses of non-ferrous metals, particularly aluminium alloys, in the building industry.

In addition to its uses as a synthetic fibre, nylon is proving most versatile in other forms. As an example, nylon monofil is now being produced in tapered form for use as an alternative to natural bristle in paint brushes, and new types of nylon suitable for moulding are now being used for purposes in which toughness and resistance to high temperatures and to solvents are important.

MINOR ELEMENTS AS FERTILISERS

*U.S. View on Encouraging Use of Micro-Nutrients**

IN developing a chemical fertiliser industry those engaged in soil fertility investigations and in supplying plant foods concentrated for years on those nutrients which seemed to be required in largest quantities—nitrogen, phosphorus, potassium and calcium.

Only comparatively recently has there been more comprehensive understanding of the plant needs for other nutrients.

Knowledge is still limited, but the fertiliser industry is now fully aware of the importance of so-called secondary and minor elements in plant feeding. What is not so clear, however, is how, when, and in what amounts these other elements are to be included in formulations.

Toxicity

The problem is complex. These other elements are not generally needed on all soils or crops. Care and knowledge are essential in their application because of the toxic potentiality of some of them to plants and animals.

Boron, for example, may be tolerated in relatively large quantities by some crops, but only in trace amounts in others. Molybdenum may be tolerated in large amounts by the plant, but such plants having a comparatively high content of the element may prove lethal to grazing livestock.

Deficiencies of these nutrients are not entirely peculiar to modern farming.

Nature in many places did not provide in the rocks and the soils derived from them a sufficient quantity of all the major and minor nutrients; or, if these were present originally, they were reduced too far by leaching and cropping. The problem has been aggravated by the decline in the use of animal power on farms. At the turn of the century about 25 million horses and mules were employed on American farms. At present the number has decreased to about 8 million. With the animals has gone the manure, which formerly furnished considerable quantities of micro-nutrients.

However, farmers are learning how to grow abundant, high-quality crops by means of commercial fertilisers and good soil-management practices. One does not have to keep cows to grow good crops. This is not to deny, however, that barn manure from grain-fed animals, where it is available, may provide good insurance against severe deficiencies of minor elements.

Under the intensive system of farming followed by U.S. market gardeners on coastal plain soils involving heavy applications of refined salts of N-P-K carriers, it is to be expected that deficiencies will show up. The level of fertility present might satisfy a small crop, but, for the acreage required by the system to be profitable, the amount of native micro-nutrients present is entirely inadequate.

Another factor is the soil *p*H. These market gardening soils are usually of a sandy open type and acid. To get high yields the grower has to lime rather heavily and frequently. One effect of heavy liming is to reduce the availability of some of the micro-nutrients—manganese and copper, for example.

The fertiliser industry and good fertiliser practices are predicated upon a knowledge of the mineral requirements of crops. As cropping becomes more and more intensified, as more synthetic, concentrated plant foods are accepted by agriculture, this basic knowledge becomes more important, especially for highly specialised farming systems and practices.

Twelve Essential Elements

We recognise now that 12 elements are essential to the growth of higher plants. Each is identified with some problem of crop nutrition. If any one is missing, crop failure results. Other elements besides these 12 are known to produce beneficial effects when applied to special crops. For our purposes, let me suggest grouping these elements into:

(a) A major group, comprising N, P, K, Ca, Mg, S. These elements are needed and are applied in major quantities.

(b) A minor group, comprising Fe, Mn, B, Cu, Zn, Mo, Co. These are required in relatively minor quantities, sometimes in mere traces.

(c) A group of beneficial elements, comprising Na, Cl, Al, Si. Sodium is beneficial to sugar beet; aluminium to azaleas and similar shrubs; chlorine to grain crops, at least in Europe; silicon seems able to

(*continued at foot of next page*)

* Abstracted from a paper by Vincent Sanchelli, director of agricultural research, the Davison Chemical Corporation, Baltimore, Md., presented at the New England Fertiliser Conference, New Haven, Conn., in February. (*American Fertilizer*, Vol. 112, No. 9).

DIALLYL CYANAMIDES

Development of New Industrial Solvents

From A CORRESPONDENT

DEVELOPMENT quantities of diallyl cyanamide, and research samples of dimethyl, diethyl and di-isopropyl cyanamides are now being made available for the first time by the American Cyanamid Company. These are of considerable potential value as solvents for many difficultly soluble substances, particularly some of the newer synthetic resins, such as polyacrylonitrile (U.S. Patent 2,404,725).

Dimethyl and diethyl cyanamides have been suggested for the improvement of nitrocellulose solutions to be used as lacquers (U.S. patent 2,198,173), and the higher allyl cyanamides have shown some promise as plasticisers, either when used alone or admixed with the lower diallyls to provide good solvent-plasticiser combinations (German patent application 172,524, 1942). Other applications found for these cyanamides include their use in hydraulic liquids and in lubricating oils (U.S. patents 2,370,663 and 2,215,591).

Physical Properties

The diallyl cyanamides are colourless, mobile liquids when pure, but they usually darken upon ageing. The boiling point (760 mm.) of dimethyl cyanamide is 160 °C.; diethyl cyanamide 186°; di-isopropyl cyanamide 207°, and diallyl cyanamide 222° (accompanied by slight decomposition). Viscosity (centipoises at 30°) varies from 0.633 for the dimethyl compound to 1.092 for the diallyl cyanamide. The flash point (Tagliabue closed cup) is 71° for the dimethyl cyanamide: 80.5 for diethyl cyanamide: 82.0° for di-isopropyl cyanamide and 96° for the diallyl cyanamide.

All these new compounds need to be handled with great care as, although their toxicity has not yet been fully determined, they are known to be dangerous to inhale and to come into contact with the skin. Preliminary tests with diallyl cyanamide show that it causes acute irritation when applied to mucous membranes, and it may be absorbed through the unbroken skin.

The diallyl cyanamides as a class are readily miscible with the common solvents, such as acetone, benzene, 1,4-dioxane, carbon tetrachloride, ethylene glycol, butyl acetate, etc. Dimethyl cyanamide is, however, only 20 per cent miscible with petrol, petroleum ether and turpentine.

diallyl cyanamides, diethyl cyanamide is the best in the series. Ester gum is insoluble in cold dimethyl cyanamide but soluble in the hot liquid: polystyrene is completely insoluble in this solvent. Cellulose acetate is only slightly soluble in hot di-isopropyl cyanamide and the same applies to methacrylate resin: ethyl cellulose is insoluble in di-isopropyl cyanamides, also in diallyl cyanamide. Methacrylate resin is only slightly soluble in diallyl cyanamide.

Diallyl cyanamides react with boiling water in the presence of mineral acids to form diallyl ureas. The substituted ureas can then be hydrolysed to the diallylamines with either hot alkali or hot mineral acids, or the diallyl cyanamides may be hydrolysed directly to the amines. The diallyl cyanamides are valuable intermediates for the synthesis of a number of potentially useful compounds, including substituted guanidines, biguanidines, normal and iso-ureas and thio-ureas.

MINOR ELEMENTS AS FERTILISERS

(*continued from previous page*)

substitute for phosphorus to some extent; and so on.

That the fertiliser industry in the U.S.A. is supplying an appreciable amount of micronutrients in its fertilisers was brought out by a report released some time ago by the U.S. Department of Agriculture, prepared by A. L. Mehring and associates.

The average chemical composition of 27 complete fertilisers from this group, selected as representative was:—

	Per Cent
Magnesia, Mg O	0.78
Lime, CaO	16.38
Soda, Na_2O	4.08
Alumina, Al_2O_3	0.58
Copper oxide, CuO	0.006
Iron oxide, Fe_2O_3	0.08
Manganese oxide, MnO	0.024
Zinc oxide, ZnO	0.022
Boric oxide, B_2O_3	0.012
Chlorine, Cl	5.86
Fluorine, F	0.70
Sulphuric oxide, SO_3	20.04
Ammonia, NH_3	2.76
Phosphoric oxide, P_2O_5	9.87
Potash, K_2O	5.36
Organic matter, etc.	6.26
Protein	3.94
Moisture	4.90
Water of hydration	3.58
CORRECTED TOTAL	99.96

The Chemist's Bookshelf

PRINCIPLES AND PRACTICE IN ORGANIC CHEMISTRY. H. J. Lucas and D. Pressman. 1949, London & New York. Chapman & Hall, Ltd. Pp. 557. 48s.

This laboratory manual on the preparation of organic compounds is intended for use in a one year's course, but for the purpose of arranging different experiments for individual members of a class a considerable amount of alternative material has been included at each stage. The first 12 chapters (137 pages) deal with theory (reaction rates, equilibrium constants, heats of reaction, bond energies, etc., with tabulated data), solubility, calibration of thermometers, determination of melting points, distillation, etc. They serve as a general introduction to common techniques. The following 32 separate chapters are devoted to the main types of organic compounds, ranging from alkanes and alcohols to sugars and pyrroles, and finally short sections on chromatography and qualitative organic analysis.

Each chapter contains, in addition to detailed instructions on specific preparations, general information about the properties and other possible methods of preparation of the class of compounds considered, and gives cross-references to other chapters, copious notes, questions to be answered by the student, and, in most cases, descriptions of brief experiments designed to illustrate the properties of the compounds prepared. The directions given are clear and precise, and are accompanied by detailed discussions of principles. The authors appear to have thought of every possible mistake that a student can make and to have warned him against it. Nevertheless, supervision by a competent instructor, to approve apparatus assemblies, etc., is presupposed. To offset the unavoidable recipe nature of most of the book there are the numerous sets of questions and the experiments designed to illustrate properties which serve to test the student's powers of observation and inference.

Claims are made that the book may meet the needs of organic chemists for a reference work on organic practice. It would seem, however, that, excellent as the book is for instruction, it is somewhat unsatisfactory for reference purposes for these reasons: the concentration on only a restricted number of reactions, sometimes on only one, used for preparing a particular type of compound; the almost complete absence of literature references: and the meagre information about properties. The section on qualitative analysis, is not dealt with at all. The work merits the attention of all whose concern it is to instruct students in organic preparative work to degree standard.

Long Service to BAC

THE approaching resignation of Mr. C. B. Woodley and his completion of 25 years' service as general secretary of the British Association of Chemists were recalled at a luncheon at the Charing Cross Hotel, London, on May 20. Members of the BAC council assembled to pay their warm regards to Mr. Woodley, to whom a cheque was presented on behalf of the association and a silver rose bowl by one member.

The president, Dr. H. Herbert Levinstein, who presented the association's gift, spoke of the general secretary's long devotion to the association and disclosed that it had been agreed to confer on him the first honorary membership. There were a number of other recognitions of the value of Mr. Woodley's long and devoted services.

Mr. Woodley, recalling the satisfaction he had derived from his service, referred with approbation to the fact that the unemployment insurance fund now amounted to £50,000 and the progress made by many who had benefited from the advice of the BAC in the past. Some 25 per cent of members were now directors, chief chemists, managers or of equivalent rank. Although the BAC had no official trade union agreement, it was regarded as the negotiating body for chemists.

Technical Publications

LARGE-SCALE glass coolers are illustrated in the April catalogue of James A. Jobling & Co., Ltd., Sunderland. One type consists of continuous Pyrex glass pipes through which flows the liquid or gas to be cooled, while cold water is cascaded over them. In addition to the chemical and thermal resistance of the glass tubing, the fact that the liquids or gases being conveyed are constantly in sight is a considerable advantage.

* * *

A NUMBER of half-tone illustrations of switches, sealing glands, lamps, and flameproof unions have been added to the paper on "Permissible Electrical Apparatus for Use in Hazardous Atmospheres" by S. W. Richards which is now published as a booklet by the General Electric Co., Ltd., London. The address was originally delivered at the second annual conference on chemical works safety held at Scarborough in October last, and is reprinted from the proceedings of the Association of British Chemical Manufacturers.

* * *

MECHANICAL applications of permanent magnets and their advantage over electromagnets are described in the April issue of the "Nickel Bulletin" published by the Mond Nickel Co., Ltd., London. Magnetic chucks, torque transmitters, welding clamps and lens-grinding magnets are among the types dealt with in this article.

* * *

DISCUSSION of the main properties of ferromagnetic materials in an electric field is the subject of an article by G. H. Jonker and J. H. Van Santen in "Philips Technical Review" (Vol. II, No. 6). The behaviour of certain chemical compounds such as $KNaC_4O_6\,4H_2O$ (Rochelle salt) and KH_2PO_4 is shown to resemble closely the phenomenon of ferromagnetism.

* * *

NATURAL derivations, geographical sources, characteristics and applications of chemicals, drugs and essential oils are summarised in a pocket-guide issued by J. Brummer, London. This is the second in a series of guides to products distributed by the company.

* * *

METHODS of controlling pumps and the level of liquids in storage tanks by means of electrodes are described in its latest publication (No. 234) issued by Evershed & Vignoles, Ltd., London. A sensitive pattern relay unit is described for the first time. An electro-magnet is connected to the 230-volt mains and acts as the primary transformer, while a coil acts as secondary transformer and develops the 12 volts supply to the electrodes. The relay will operate through a water resistance of 3000 ohms.

* * *

METAL turning of practically all types can be reduced from tangled masses into short chips by the B. J-D flextooth metal turnings crusher, details of which are given by British Jeffrey-Diamond, Ltd., Wakefield, Yorks., in its latest leaflet, No. 1451c.

* * *

DESIGN and Construction of Welded Pressure Vessels, a paper recently read to the Liverpool and North Wales branch by J. R. Dood, is one of the main features of the current issue of the *Journal of Incorporated Plant Engineers* (Vol. II, No. 2).

* * *

CONTINUED expansion of several departments of the plastics industry, and an ever increasing variety of applications make the British Plastics Year Book for 1950 (Iliffe and Sons, Ltd., London, 30s.) of more than ordinary value as a source of information. Of particular interest is the first section, devoted to a review of recent patents, in which it is shown that it is in ethenoid resins that the greatest development is taking place. The make-up of recent editions has been retained, all the nine sections having been expanded and revised.

* * *

THE use of the resonance vibration method of testing spot welds has been successfully employed for testing mild steel structures. Certain difficulties have been apparent, however, when the method is applied to structural specimens constructed of thin sheet, due to the fact that it was necessary to attach masses to the specimen to produce inertia forces. The tests, which have now been outlined by R. Week, Ing. Ph.D. in *Welding Research* (No. 2, April), were, therefore, purely exploratory and were carried out with the object of gaining experience and overcoming the special problems encountered in this particular field of application. The same issue has a review by E. K. Frankl of previous investigations of the behaviour of welded structural connections and describes some new test procedure.

OVERSEAS CHEMISTRY AND INDUSTRY

GERMAN AND SPANISH DEVELOPMENTS

India Establishes Commercial Acid Standards

TOTAL production of synthetic fibres in Western Germany was 1?0,000 tons in 1949, of which rayon accounted for 47,000, the remainder being cellulose wool. In the eastern zone the total was 60,000 tons.

In the east and west the polyamide fibre, Perlon, was being made in 1949, but production was relatively small. In the Obenburg factory of Vereinigte Glanzstoff-Fab. A.G. an experimental plant is making about 100 kg. per day. The chief type at present is 60 denier yarn, but finer threads are to be made as soon as possible.

A larger plant is being built at Oberbruch, Aachen. Other firms also contemplate manufacture, and it is expected that output of Perlon fibre also will be increased by the Kunstseidefab. in Bobingen, and others. Chief producer of Perlon in the Eastern zone is VVB(Z)-Kunstfaser-Thuringische Zellwolle, of Schwarza (Saale), which is building a new factory with a probable output of 100 tons per day.

It has been decided by the Arbeitsgem. Kunstseide- u. Zellwolle-Ind. to change its name to Industrievereinigung Chemiefaser. Chemiefaser is the general term including rayon, Perlon, nylon and Zellwolle.

Spain

A LONG authoritative report by the director of the chief electrical undertaking in Spain, Unidad Electrica S.A. (or UNESA), Señor J. L. Redonet Maura, gives a detailed account of the present and potential sources of electrical power from hydro-electric and thermal power stations in Spain. The subject is intimately connected with the ambitious two-year plan for expanding the chemical industries. These, and especially the fertiliser manufacturers, are among the largest consumers of electric power.

The present review, published in DYNA, *Revista de la Asoc. Nac. de Ingenieros Indust.*, *25*, (4) p. 131-150, recalls that various estimates have been made of the total possible yield from water power generators, ranging from 5 million h.p. in 1908 to 12.5 million h.p. (9 million kW) in 1932. The present author has made a fresh survey, and from his tabulated figures the grand total of 9 million kW is again obtained, of which 1.7 million is already installed, 1.4 million is under construction, and about 5.9 million in various stages of planning. The maximum foreseeable demand is thought to be 36 million kWh per annum.

The possibilities of thermal stations, depending on coal and lignite, are much smaller. In 1948, output of anthracite was 1.5 million tons, of ordinary coal 9 million, and of lignite 1.5 million. Both coal and anthracite showed a small decline compared with previous years and lignite only a slight increase. Four different types of thermal power stations are considered: (a) pit mouth stations using inferior coal; (b) pit mouth stations with richer coal; (c) power stations in industrial centres using good coal; and (d) movable power plants using fuel-oil and coal. Particulars of ten thermal stations belonging to one or other of these groups are given. It is believed the potential electrical yield of these four methods would be: (a) 690,000 kW, (b) 87,500 kW, (c) 211,580 kW, and (d) 31,000 kW; total 1,020,080 kW.

India

THE Indian Standards Institution has drawn up draft standard specifications for sulphuric, hydrochloric, nitric and boric acids.

The standard for sulphuric acid covers the technical, battery, pharmaceutical and analytical reagent grades; for hydrochloric acid, the technical, pharmaceutical and analytical reagent grades; and for nitric acid, technical, nitration, pure and analytical reagent grades.

The specifications prescribe the minimum content of the acids and their specific gravities. The limits for residue on evaporation, iron oxidising impurities, heavy metals (lead), arsenic and other insoluble impurities have been fixed. Clauses relating to containers, method of packing, marking and sampling of the acids are also included.

The standard for boric acid (commercial) prescribes the acid content of the material, the limits for free moisture and soluble iron compounds. For use in electrolytic condensers, the limits for chlorides, sulphates and heavy metals are also included. The method of sampling and analysis of boric acid is stated in the form of two appendices.

HOME

Explosion at Aluminium Works

An explosion last week at the experimental mill of the Northern Aluminium Company, Banbury, Oxfordshire, killed two men and burned two others. They were working just outside the building.

Record Coal Output

Coal output last week represented a record for 1950—4,535,900 tons, compared with 4,389,900 tons the week before. The previous best, in the week ended December 17, 1949, was 4,574,300 tons.

Whales for Fertiliser

Part of the school of whales washed up on the Scottish coast near Dunbar were last week taken on lorries to Warrington on their way to the Riverside works of Henry Quennel, Ltd., for conversion to oil and fertiliser.

Rise in Chemical and Metal Prices

The price index of non-ferrous metals last month was 277.6 (274.3 in March). This is an increase above April, 1949 of 5.4 per cent. The chemicals and oils index was 201.5 (196.6 in March) and shows an increase of 5.5 per cent above April, 1949, according to statistics published in the *Board of Trade Journal*.

Petroleum Distributor's Economy

Scottish Oils & Shell-Mex, Ltd., which is the marketing organisation for the Shell and Anglo-Iranian Companies, is to reduce the number of its divisions in the United Kingdom from 18 to 10. This re-organisation is expected to assist in lowering the costs of petroleum and fuel oil distribution. The regrouping of divisions to align with the refineries now being built is stated to be one of the reasons for this decision.

Plastic Materials Freed

The Board of Trade announces that from June 1 the following will be added to the list of materials which may be freely imported from countries participating in the freer trading arrangements: fluorspar; carnauba wax; ouricury wax; casein; caustic potash; copper sulphate; phenol and cresol formaldehyde moulding powders and resins; polyvinyl chloride; sodium chloride; urea formaldehyde moulding powders and resins. Amendments have removed from the list of exceptions to the free import principle the following: Butyl acetate, butyl alcohol, ethyl acetate, ethyl lactate, ethyl silicate, ethylene glycol, glycol ether esters, glycol ethers, iso-butyl alcohol, lactic acid, triethanolamine.

Dunlop Gifts

The Dunlop group has sent £50 to the Manchester Joint Research Council and 50 guineas to the National College of Rubber Technology.

New Edinburgh Quarters

Griffin and Tatlock, Ltd., have moved to new premises at 8-13 Johnston Terrace, Edinburgh, which will afford enlarged scope for handling their range of scientific equipment and laboratory equipment.

Copper Price Raised

An immediate increase in price of electrolytic copper by £6 from £164 to £170 a ton, delivered, was announced by the Ministry of Supply on May 19. This followed an increase of £2 a ton the previous day.

A BIF Record

Overseas visitors at the British Industries Fair numbered 19,005, a record, and home trade buyers 113,102. The comparable figures in 1949 were 17,061 and 121,555.—The Secretary for Overseas Trade.

Loans to Chemical Industry

Loans and investments approved for chemical industries by the Industrial and Commercial Finance Corporation, Ltd., from September 1945 until March 31, 1950, amounted to £1,719,100. This is 8.3 per cent of the total capital invested in some 50 industries.

Engineering Research Centre

Work on the DSIR project at East Kilbride, where a mechanical engineering research centre is being built, is reported to be making good progress. Structural steelwork is being erected on the main site, roads are under construction and ancillary facilities are being established. The centre will undertake research in a number of chemical engineering subjects.

Isotopes in Industry

A conference for industrial engineers, chemists, metallurgists and others interested in the application of artificial radioactive substances to industrial problems was held last week-end in Birmingham. Three scientists from the Atomic Energy Research Establishment, Harwell, Dr. W. J. Arrol, Dr. W. G. Morley and Dr. H. Seligman were among the lecturers. The conference was arranged by the Extra Mural Department of Birmingham University in co-operation with the Atomic Scientists' Association.

· PERSONAL ·

Mr. W. F. Mitchell

MR. HENRY J. TALBOT has been appointed joint managing director of Dorr-Oliver Co., Ltd. In association with Mr. J. M. Lee, he will be responsible for the general management of the company. Mr. Talbot, who for the past few years has been a director and chief engineer of Dorr-Oliver Co., Ltd., is also a director of the various Continental subsidiaries of the Dorr Company of America.

MR. H. IRWIN has been elected to the board of Triplex (Northern), Ltd., the safety-glass firm of St. Helens, Lancs. Mr. Irwin, who is 52, joined the company as general manager in 1946, and had previously held design and administrative posts in the plate and sheet glass works of Pilkington Brothers, also of St. Helens.

DR. J. B. TOOGOOD, aged 24, an organic chemist at the Huddersfield branch of I.C.I., Ltd., has been awarded one of six scholarships for the whole country, financed by American firms, to attend a four-months course at Massachusetts Institute of Technology. Dr. Toogood, a native of Newport, Mon., hopes to study applied chemistry in relation to works management.

The King's Commendations have been awarded to MR. W. I. INESON, chief chemist, and MR. F. J. WADSWORTH, relief shift engineer and general assistant, at the Birkshall gas works, Bradford. In February they extricated Mr. H. Horsfield, junior clerk of works, from a pit in which he had been overcome by gas fumes. He has since died.

To control its increasing chemical activities, the Shell Petroleum Co., Ltd., has formed a department of chemical industry management, which is to administer the company's chemical commercial enterprises throughout the world, except Canada and the U.S.A. MR. W. F. MITCHELL has been appointed head of the department.

MR. IAIN M. STEWART, son of the late Sir Frederick Stewart, has been appointed chairman of Thermotank, Ltd. A B.Sc. of Glasgow University and of the Royal Technical College, he joined the board and became managing director in 1945.

SIR EDWARD APPLETON last week delivered a commemorative broadcast on the occasion of the centenary of the birth of Oliver Heaviside, the mathematical physicist, whose conclusions relating to the earth's upper atmosphere (the Heaviside Layer) Sir Edward verified.

DR. F. S. DAINTON, B.A., B.Sc. (Oxford), Ph.D. (Cambridge), has been appointed professor of inorganic and physical chemistry at the University of Leeds. The appointment will date from October 1 this year. Dr. Dainton, who is 35, became a university lecturer and later a Fellow of St. Catherine's College, Cambridge, and is at present Praelector and director of studies in physical science at the College.

The Court of Governors of Manchester University has approved the recommendation of the senate and council to confer the honorary degree of M.Sc. on DR. W. H. BRINDLEY, M.C., for industrial and public services. Dr. Brindley is librarian to Hardman & Holden, Ltd., of Manchester, and he has been the hon. secretary of the Manchester section of the Society of Chemical Industry for many years.

The honorary degree of Doctor of Science of Leeds University was presented last Saturday to EMERITUS PROF. ROBERT W. WHYTLAW-GRAY, professor of chemistry at Leeds 1923-45.

MR. DONALD HAMILL, who has completed 30 years' service with John W. Leitch & Co., Ltd., Huddersfield, was last week presented with a silver tea set.

MR. EVAN CHARLES EVANS, Forest Hill, West Kirby, late technical director of Goodlass Wall and Co., Ltd., left £3728 (net £3234).

· OVERSEAS ·

Belgian Steel Expansion

The Belgian metallurgical concern S.A. Ougrée-Merihaye proposes to modernise its rolling mill at a cost of $16 million, half of this sum to come out of ECA allocations. Its capacity, when completed, will total 378,000 tons.

Brussels Plastics Fair

The Office Belge des Matières Plastiques is arranging its third Plastics Fair from June 10 to 25, 1950, in the Palais du Centenaire. Inquiries are being received by the Office Belge des Matières Plastiques, 326 rue Royale, Brussels.

Wax and Petroleum

Construction will begin in Eastern Venezuela next year of a new refinery and wax producing plant with an annual capacity of over 2 million lb. of high grade wax for the U.S. Phillips Petroleum Company.

Guarantee Stamps for Pharmaceuticals

To protect the public against traffic in unauthorised products, all drugs, medicinal products and cosmetics, both national and foreign, sold in Colombia now have to bear a guarantee stamp. Value of the stamp is added to the sale price and the resulting revenue is to be used in a hygiene campaign.

Leuna Works in Russia?

Statements by former German prisoners-of-war who have returned from Soviet Russia claim that the Leuna works of Merseburg (Russian zone of Germany), formerly the largest and most up-to-date plant for the manufacture of synthetic petrol in Europe, has been removed during 1946-47 and erected in the region of the Dniester estuary, between Tiraspol and Nikolayev. A number of German experts are said to have been compulsorily transferred there.

U.S. Aluminium Production

February witnessed the starting of the reduction plant of the Aluminium Company of America at Point Comfort, near Port Lavaca, Texas. This is the first plant to be constructed since the war, and utilises natural gas as a source of power. Total output of primary aluminium in the U.S.A. during February declined by 3 per cent to 50,688 short tons, because of the shorter month. The daily average output, however, increased, and the total was 919 short tons more than the same month of 1949.

Optical Glass for India

The Government of India is to install an optical glass factory of 10-12 tons capacity, adjacent to the Central Glass and Ceramic Research Institute, which will be responsible for its technical guidance.

Austrian Fertilisers for Hungary

A trade agreement between Austria and Hungary provides for the Austrian Nitrogen Works, of Linz, to export 30,000 tons of chemical fertilisers, worth about $2 million.

Zinc Production in Italy

Italy's zinc production is expected this year to reach pre-war figures. With Marshall Aid, it is planned to construct a 9000-ton capacity zinc electrolytic plant which is expected to be completed in 1953.

Dutch Colorants in Germany

The Dutch Dye Manufacturers' Union is complaining that, despite a treaty with Germany for the free import of colorants, the German Federal Government will not now authorise such imports. The Dutch industry, claiming that as a result it has suffered considerable losses, is seeking reparations.

Chile's New Steel Centre

Chile's first integrated steel plant, begun in 1947 and costing more than $70 million, has started operation. Erected near Concepcion, for the Pacific Steel Company of Chile, its blast furnace is designed to produce 700 tons of iron per day. The plant has an open hearth furnace, a Bessemer converter, an electric furnace, and auxiliaries for handling tar, light oils and gas.

Rising Total of Italian Cement

During the first quarter of the current year, portland cement works in Italy registered an increase in output of about 30 per cent compared with the corresponding period of 1949. The increase, most unusual in Italy at this time of the year, is accounted for by improved supplies of coal and electric power and an increased demand. Numerous hydro-electric schemes are being carried out involving heavy use of portland cement. During 1949 nearly 8.5 million tons of portland cement products were produced in Italy, some 10 per cent more than in 1938. During the current year an output of about 10 million tons is expected. Italian cement exports in 1949, principally to Mediterranean countries, realised 1000 millon lire.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

AURATONE LABORATORIES, LTD., London, W.C. (M., 27/5/50.) April 25, £2000 charge, to H. E. G. Piper, London, and another; charged on 1 The Barracks, Westcott (Sy.). *£2648. June 2, 1948.

CLAY & SON, LTD., London, E., manufacturers of manures, etc. (M., 27/5/50.) April 20, assignment securing to Midland Bank, Ltd., all moneys due or to become due to the Bank; charged on a contract. *£6000. October 15, 1947.

DENTON & JUTSUM, LTD., London, E., varnish manufacturers. (M., 27/5/50.) April 20, £25,000 mort., to Legal & General Assurance Soc., Ltd.; charged on factory premises in Stour Road, Bow, E.3. *£35,000. January 14, 1949.

HILDEN LABORATORIES, LTD., London, E.C. (M., 27/5/50.) April 18, £500 deb., to R. G. Warren, Farnham; general charge. *——. February 14, 1950.

PEST CONTROL, LTD., Bourn (Cambs.). (M., 27/5/50.) April 6, £500,000 secured stock together with a premium of up to 4 per cent, payable in certain events, secured by a trust deed dated March 31, 1950; charged on properties specified in schedule to deed, and a general charge.

PEST CONTROL (UNITED KINGDOM), LTD., Bourn (Cambs.). (M., 27/5/50.) April 6, Trust Deed dated March 31, 1950, for securing £500,000 secured stock of Pest Control, Ltd., together with a premium of 4 per cent, payable in certain events; charged on properties specified in schedule to deed (subject to etc.), also a general charge. *£218,364. January 14, 1949.

Satisfactions

FLINTO, LTD., London, W., manufacturers of enamels, etc. (M.S., 27/5/50.) Satisfaction April 26, of charge reg. January 28, 1949.

SHEPPY GLUE & CHEMICAL WORKS, LTD., Horley. (M.S., 27/5/50.) Satisfaction April 21, £60,000. reg. September 18, 1928.

Company News

Boots Pure Drug Co., Ltd.

A final dividend of 20 per cent, less tax, on the £1.92 million of ordinary capital for the year ended March 31, is recommended by the board of Boots Pure Drug Company. This makes a total for the year of 40 per cent (same). The group net profit, subject to audit, was £1,060,614 (£1,070,734).

Glaxo Laboratories, Ltd.

The interim dividend is announced as 5 per cent on the ordinary stock. The equivalent distribution last year, after allowing for the bonus issue, was 5.4d. per 10s. unit.

Powell Duffryn, Ltd.

Powell Duffryn, Ltd., announces a dividend of $2\frac{3}{8}$ per cent, less tax, on the £3.6 million $4\frac{3}{4}$ per cent cumulative preference stock for the half year to June 30, 1950. Payment will be made on July 1, to holders registered on June 2, 1950. Dividends on the $4\frac{3}{4}$ per cent cumulative preference stock for the 6 months periods will in future be paid on July 1 and January 1.

Ciba Success in Italy

The Ciba-Industria Chimica, Milan, the Italian subsidiary of the Swiss group, which produces chemicals, pharmaceuticals dyes and cosmetics for the Italian market, reports an increase in net profits last year from L. 14 million to 21 million.

Norwegian Aluminium

A gross working profit of £250,000 in 1949 is reported by AS Aardal Verk, the large aluminium works established by the Norwegian Government after the war. The output of aluminium last year was about 10,000 tons, but extensions are in hand which will raise production considerably. The aluminium has markets in Denmark, Sweden, Finland, the Soviet Union, Poland and Belgium.

Increases of Capital

The following increase of registered capital has been announced: Mediplastics, Ltd., from £3000 to £6000.

(*continued on next page*)

Chemical and Allied Stocks and Shares

STRENGTH of British Funds has been the outstanding feature of the stock market. This has been evidenced by the response to the East Africa Loan terms, the premium of up to 11s. 3d. on the new 3½ per cent Electricity stock and the belief that the issue of some £20 million of British Coal stock, to be made later this month, is also likely to be a 3½ per stock offered at slightly under par.

Gilt-edged stocks have attracted a good deal of buying because sentiment in regard to industrial shares has been influenced by rising costs, which connote reduced earnings in future for a wide range of companies. In most cases, however, it seems that it should be possible to maintain dividends, and, before long, the good yields now ruling on industrial shares may attract a better demand. On the other hand, markets are governed largely by the belief that the general election will be held later in the year.

Shares of chemical and kindred companies have reflected the somewhat uncertain conditions in the industrial sections of markets. In most cases, movements were small and indefinite, but buyers of leading shares followed any reaction in prices. Imperial Chemical were active amound 40s. 9d., awaiting the annual meeting on June 8, which the market expects to reveal whether I.C.I. will have to raise more capital this year. Monsanto were 48s., F. W. Berk 2s. 6d. shares, at 15s., remained under the influence of the financial results. Albright & Wilson 5s. shares (28s.) remained steady, Amber Chemical 2s. shares were 4s. 9d., Boake Roberts 5s. shares 26s., and Bowman Chemical 4s. were 5s. 3d.

Brotherton 10s. ordinary again changed hands around 19s. 6d. Pest Control were 7s. 9d., L. B. Holliday 4½ per cent preference 19s. 9d., and, elsewhere, Fisons strengthened to 25s., and William Blythe 3s. were quoted at 9s. 3d. xd.

There was a sharp reaction in Glaxo Laboratories at 46s. 9d., the 5 per cent interim dividend being lower than had been expected in the market. It is clear, however, that the company is following the policy of abiding by dividend limitation and, in the circumstances, it is unlikely that much more cash will be distributed as dividend than before the big increase in the capital which resulted from the share bonus. It is realised that earnings are such as to permit a substantial increase in dividend, if dividend limitation should end.

Boots Drug have been firm at 48s., the 40 per cent dividend on the larger capital being maintained. Turner & Newall, at 80s. 6d., were easier, following the unchanged interim dividend, and United Molasses were higher at 42s. 6d. on the full results. The 4s. units of the Distillers Co. moved up to 18s. and British Plaster Board strengthened to 16s.

Iron and steel shares remained firm after the decision to end steel rationing, except for steel sheets and tinplate. Guest Keen rallied to 42s. 6d., Stewarts & Lloyds were 54s. 10½d., United Steel 25s. 7½d., and Dorman Long 30s. 6d.

Shell eased to 66s. 3d. despite the group's large profit, the market being disappointed that the dividend is again limited to 7½ per cent, tax free.

LAW AND COMPANY NEWS

(continued from previous page)

New Registrations

A.L.X. (London), Ltd.

Private company. (482,201). Capital £100. Cleaners and treaters of leatherware, manufacturers of chemical compounds, manufacturing chemists, etc. Director: Alexr. Fried. Reg. office: 64 Aldermanbury, E.C.2.

Bacterol (1950), Ltd.

Private company. (482,249). Capital £5000. Manufacturers, etc., of sterilising equipment, disinfectants and insecticides. Director: A. Binnie. Reg. office: Plantation House, Mincing Lane, E.C.3.

Bullus & Co. (Dyers), Ltd.

Private company. (482,255). Capital £10,000. Dyers and finishers, carbonisers, chemical manufacturers, etc. Directors: T. E. Bullus; T. Bullus. Reg. office: 28 East Parade, Leeds 1.

Brockwell Plastics, Ltd.

Private company. (482,254). Capital £500. Manufacturers of plastic modelling and moulding materials, etc. Directors: G. J. Clarke, F. E. Clarke and G. R. B. Clarke. Reg. office: 196 High Street, Bromley.

A. Leete & Co., Ltd.

Private company. (482,198). Capital £10,000. To acquire the business of paint and varnish manufacturers carried on as A. Leete & Co., at 129/130 London Road, Southwark, S.E.1. Directors: D. C. Leete, Sybil F. Leete, S. A. Cook. Reg. office: 129/130 London Road, S.E.1.

Prices of British Chemical Products

First Effects of the New Freight Rates

THERE has been no lack of interest in the industrial chemicals market and buying for home account has covered good volumes. Export inquiry also is reported to be well maintained. Although there have been no outstanding price changes during the week, the undertone is firm in most sections and some adjustment in quotations to cover the increased transport costs seems unavoidable. Among the soda products, there is a strong demand for soda ash, chlorate of soda and hyposulphite of soda, while available offers of the potash chemicals are quickly absorbed. The lead oxides are in steady request at the higher rates now ruling. There has been a good demand for pitch, crude tar and creosote oil, and the xylols and naphthas continue the subject of good inquiry.

MANCHESTER. — Reasonably satisfactory trading conditions have been reported on the Manchester chemical market during the past week. Delivery specifications covering textile and other industrial chemicals are circulating freely and a fair amount of fresh inquiry concerning home and overseas business has been reported. Generally firm price conditions continue. In the market for the by-products, crude tar, creosote oil and carbolic acid are in steady request and a good demand has been reported during the past few days for the xylols and most of the other light distillates. Quieter conditions are now being experienced in the fertiliser trade.

GLASGOW.—The Scottish chemical market has shown little change, apart from the seasonal increase in demand for paris green and low concentration DDT dusting powders. There have, however, been numerous increases in price resulting from the increased road, rail and sea freights, and these increases have, as usual, a bigger effect on Scottish industry than English.

Price Changes

Rises: Ammonium sulphate, cobalt oxide, litharge, naphthalene, pyridine, red lead, salicylic acid, white lead, zinc oxide.

Reductions: Cream of tartar, cresylic acid, naphtha, pitch, tartaric acid, toluol.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £61; 80% pure, 1 ton, £66; commercial glacial 1 ton £71; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £110 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over, £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 1d. per proof gallon; 5000 gal. lots, d/d, 2s. 2½d. per proof gal.

Alcohol, Diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £40 per ton.

Ammonium Carbonate.—1 ton lots; MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate.—MANCHESTER: £5 per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £171 10s. per ton.

Antimony Oxide.—£160 per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots, as to grade, etc., 1s. 9½d. to 2s. 4½d. per lb. Crimson, 2s. 6¼d. to 3s. 3½d. per lb.

Arsenic.—Per ton, £38 5s. to £41 5s., ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £27 5s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £29 10s. per ton d/d; 2-ton lots, £29 15s. per ton.

Bleaching Powder.—£25 15s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £54; in 1-cwt. bags, commercial, granular, £34 10s.; crystal, £37; powder, £38, extra fine powder, £39; B.P., granular, £44; crystal, £46; powder, £48-£48 10s.; extra fine powder £48.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £62; crystal, £69; powder, £66 10s.; extra fine powder, £68 10s.; B.P., granular, £75 10s.; crystal, £81; powder, £78 10s.; extra fine powder, £80 10s.

Butyl Acetate BSS.—£149 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£140 10s. per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £8 per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Controlled prices per lb., d/d buyers' premises. For 5 cwt. or over, anhydrous, 1s. 6½d., other, 1s. 5d.; 1 to 5 cwt., anhydrous, 1s. 9d., other, 1s. 7d. Higher prices for smaller quantities.

Cobalt Oxide.—Black, delivered, 9s. 10d. per lb.

Copper Carbonate.—MANCHESTER: 1s. 7½d. per lb.

Copper Chloride.—(53 per cent), d/d, 1s. 11½d. per lb.

Copper Oxide. — Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(53 per cent), d/d, 1s. 10d. per lb.

Copper Sulphate.—£47 5s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £7 2s. per 10 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £103 10s. per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1260 s.g. 128s. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 18s. per lb. in cwt. lots.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale tech., £85 per ton; dark tech., £75 per ton ex works; barrels returnable.

Lead Acetate.—Nominal.

Lead Carbonate.—Nominal.

Lead Nitrate.—Nominal.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £114 5s.; orange lead, £126 5s. Ground in oil: red, £136 15s.; orange, £148 15s.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £123 10s. per ton, Ground in oil, English, under two tons, £143.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£114 5s. per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £70 per ton.

Magnesium Chloride.—Solid (ex wharf), £20 to £25 per ton.

Magnesium Oxide.—Light, commercial, d/d. £160 per ton.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 7s. 4d.; smaller quantities dearer

Mercurous Chloride.—8s. to 9s. per lb., according to quantity.

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 3s. 7½d. per gal.; pyridinised 64° O.P. 100 gal., 3s. 8½d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb. (Nominal.)

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—£128 to £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d., according to grade for 1 ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £61 per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9§d. per lb.; ground, 10§d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iodide.—B.P., 11s. 1d. to 12s. per lb., according to quantity.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, **1s. 6d. per lb.; technical,** £6 13s. to £7 13s. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, **£72** 10s per ton; medium, **£67** 10s. per ton; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid.—MANCHESTER: 2s. to 3s. 3½d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£41-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £29 12s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite. — Pea crystals £23 2s. 6d. a ton; commercial, 1-ton lots, £21 12s. 6d. per ton carriage paid.

Sodium Iodide.—B.P., 16s. 9d. per lb, in cwt. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £101 10s. ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, **£20 10s.** per ton.

Sodium Nitrite.—**£29 10s.** per ton.

Sodium Percarbonate.—12½% available oxygen, £7 16s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £32 10s., anhydrous, £65; tri-sodium, crystalline, £32 10s., anhydrous, £62.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £24 15s per ton, d/d, in drums; broken, £25 5s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, **£15 11s. 6d. to £17 16s. 6d.** according to fineness.

Sulphuric Acid.—160° Tw., £6 16s. to £7 16s. per ton; **140° Tw.,** arsenic free £5 10s. per ton; 140° Tw., arsenious, £5 2s. 6d. per ton; Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £8 5s.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) **£102 per ton.**

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £100 10s.; green seal, £99 10s.; red seal, £98.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £11-£11 10s. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£56 to £59 per ton, according to quantity.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £36 15s. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £10 12s.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. No. 1 grade, where available, £10 17s. I.C.I. Special No. 1, £16 11s. National No. 2, £11 0s. 6d. per ton.

"Nitro-Chalk."—£10 4s. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £11 per ton.

Coal-Tar Products

Benzol.—Per gal, ex works: 90's, 3s. 3d.; pure, 3s. 5½d.; nitration grade, 3s. 7½d.

Carbolic Acid.—Crystals, 10½d. to 1s. 0½d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 10¾d. to 1s. 0¾d. per lb., d/d crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 6½d. to 9¾d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9¾d. per gal.

Cresylic Acid.—Pale 98%, 3s. 3d. per gal.; 99.5/100%, 3s. 11d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, 3s. 11d. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £9 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 90s. per ton f.o.r. suppliers' works; export trade, 110s. per ton f.o.b. suppliers' port. MANCHESTER: £5 10s. f.o.r.

Pyridine.—90/160°, 22s. 6d. MANCHESTER: 20s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal. MANCHESTER: Pure, 3s. 2d. per gal. naked.

Xylol.—For 1000-gal. lots, 4s. 0½d. to 4s. 3d, per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: May 23. The prices of all refined oils and fats remain unchanged during the eight-week period ending on July 12. The prices of all unrefined oils and fats remain unchanged during the four-week period ending on June 3.

Patent Processes in the Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patents Office, Southampton Buildings, London, W.C.2 at 2s. each. Higher priced photo-tat copies are generally available.

Complete Specifications Accepted

Process and apparatus for the preparation of thermoplastic powders.—C. Pasquetti. March 5 1947. 638,992.

Manufacture of substantially anhydrous sodium soap lubricating greases.—N.V. De Bataafsche Petroleum Maatschappij. March 20 1947. 639,203.

Starch processing and products.—R. T. Vanderbilt Co., Inc. April 1 1947. 638,996.

Refining of naphtha produced by the distillation of coal tar.—Midland Tar Distillers, Ltd., D. W. Parkes, and I. A. M. Ford. April 14 1948. 639,137.

Powder metallurgically produced materials and processes for making the same.—American Electro Metal Corporation. April 28 1947. 639,138.

Vitreous enamelling materials and processes.—Poor & Co. May 16 1947. 639,055.

Production of diethyl ketone.—E. I. Du Pont de Nemours & Co., W. F. Gresham, R. E. Brooks, and W. E. Grigsby. June 3 1948. 638,917.

Tertiary amines and methods for obtaining the same.—Parke, Davis, & Co. July 7 1947. 639,217.

Process for the preparation of diaminotriazines.—Produits Chimiques de Ribecourt. July 16 1947. 639,218.

Apparatus for electroanalysis.—A. H. Stevens. (Zbrojovka Brno, Narodni Podnik). July 24 1947. 639,219.

Aldehyde-phenol-phenol ether condensation products.—Harvel Corporation. July 30 1947. 639,220.

Process for purifying agar-agar.—T. S. Lian. Aug. 1 1947. 639,222.

Microscopy.—F. H. Smith. Aug. 5 1948. 639,014.

Process for the manufacture of dl-3, 4-(2[1]-keto-imidazolido)-tetrahydrofurane-(2)-n-valeric acid and intermediates therefor.—Roche Products, Ltd. Aug. 7 1947. 639,149.

Cooling of gases in re-circulating gas systems.—Westinghouse Electric International Co. Aug. 7 1947. 639,150.

Production of magnesium oxychloride cementitious compositions. — Westvaco Chlorine Products Corporation. Aug. 8 1947. 638,926.

Pterin compounds and process of preparing same.—Parke, Davis, & Co. Aug. 26 1947. 639,154.

Production of caustic magnesia. — K. Konopicky. Aug. 29 1947. 639,228.

Penicillin manufacture.—I.C.I., Ltd., J. Dobson, H. Gudgeon, and T. Leigh. Oct. 13 1948. 639,231.

Manufacture of diamino-diphenyl-ureas.—Ciba, Ltd. Nov. 11 1947. 639,021.

Crystallisation of penicillin.—E. Lilly & Co. Nov. 18 1947. 638,938.

Emulsions of ethylene polymers and interpolymers.—I.C.I., Ltd., and L. Seed. Nov. 17 1948. 639,025.

Process of activating the oxidising power of chlorite solutions.—Solvay & Cie. Nov. 19 1947. 639,235.

Electrodeposition of solid ethylene polymers.—E. I. Du Pont de Nemours & Co. Jan. 8 1948. 639,084.

Method of making chlorine dioxide.—Mo Och Domsjo A/B. Jan. 9 1948. 639.085.

Magnesium titanate phosphors.—British Thomson-Houston Co., Ltd. Jan. 14 1948. 639.086.

Treatment of ferrous metals.—I.C.I., Ltd., and J. B. Delany. Jan. 26 1949. 638,943.

Finishing of anodised aluminium. — Altones, Ltd., and W. J. Campbell. Feb. 20 1948. 639,090.

Aqueous solutions containing soapless detergents.—I.C.I., Ltd., and F. J. Pollok. March 2 1949. 639,173.

Method of making organic silicon compounds.—Mo Och Domsjo A/B. March 8 1948. 638,951.

Methods of eliminating moisture from the surface of moisture absorbent sheet material on which metal is to be deposited by thermal evaporation in a vacuum, and apparatus for so treating the material.—P. Alexander. March 15 1949. 639,099.

Ion-exchange processes for the treatment of liquids.—Permutit Co., Ltd. April 5 1948. 638,956.

Manufacture of nicotinic acid-β-picolylamide.—Roche Products, Ltd. April 23 1948. 639,246.

Methods of forming germanium films.—British Thomson-Houston Co., Ltd. June 23 1948. 639,109.

Mixing and homogenising apparatus.—T. Giusti & Son, R. B. Giusti, and T. Giusti. June 22 1949. 638,966.

Ionisation chambers.—O. R. Frisch. March 12 1945. 639,251.

Apparatus for manufacturing reinforced tubes from thermoplastic materials by extrusion.—Soc. Per Azioni Lavorazione Materie Plastiche. May 2 1946. 639,538.

Heat-treatment of magnetic alloys containing iron.—Telegraph Construction & Maintenance Co., Ltd., W. F. Randall, and H. H. Scholefield. Oct. 24 1947. 639,252.

Method of preparing opaque films from synthetic linear polyamide compositions.—Munising Paper Co. Jan. 9 1947. 639,327.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

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No. 201 One **DITTO.**

No. 202 One **DITTO.**

No 204 One **WERNER PFLEIDERER MIXER OR INCORPORATOR,** similar to the above, with a C.I. built pan 25 in. by 25 in. by 19 in. deep, belt pulleys 26 in. diam. by 5 in. face, double fin-type agitators, and mounted on C.I. legs.

No. 205 One larger **WERNER-TYPE MIXER OR INCORPORATOR,** by Dobson & Barlow, with C.I. built pan or mixing chamber, of the double "U" type, 4 ft. 6 in. by 3 ft. 7 in. by 3 ft. 10 in. deep, with a jacketed bottom and sides to within about 12 in. of top, and fitted with double "Z" type agitators, counterbalanced cover, machine-cut gears at each side, steel back-frame with counterbalancing weights and self-contained belt-driven tipping gear and main triple fast and loose belt pulleys 30 in. diam. by 6½ in. face, with belt fork. Approximate overall sizes, 12 ft. long by 8 ft. wide by 10 ft. high.

No. 206 One **DITTO** of the same pattern, by **DOBSON & BARLOW**

No. 208 One **DITTO** by **WERNER PFLEIDERER,** with a C.I. built pan or mixing chamber, of the double "U" type, 4 ft. 5 in. long by 3 ft. 8 in. by 33 in. deep, with double "Z" mixing arms, gears at each end, hand-operated tilting gear, with steel backframe, counterbalancing weights and chains, and fast and loose pulleys 3 ft. diam. by 6 in. face.

No. 209 One **HORIZONTAL "U"-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

No. 210 One **HORIZONTAL MIXER** as above.

No. 211 One **HORIZONTAL MIXER** as above.

No. 212 One **HORIZONTAL MIXER** as above.

No. 213 One **HORIZONTAL MIXER** as above.

These five "U"-shaped mixers are in some cases fitted with steel plate covers and a steam jacket round the bottom and extending to within about 18 in. of the top with plain end plates.

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